ELECTRICAL REVIEW

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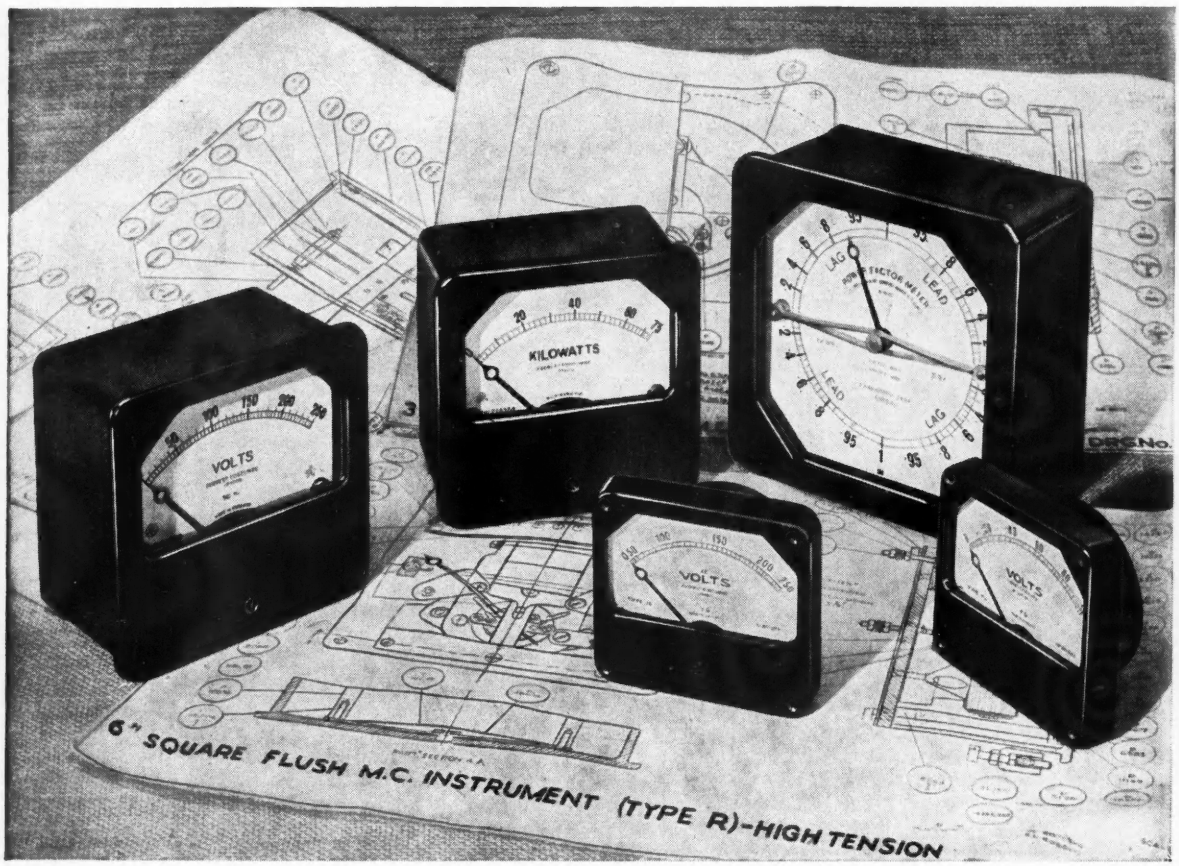
INSTRUMENTS *of Pedigree*



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ELECTRICAL REVIEW

12 February 1954 Vol. 154 No. 7 Established 1872

Steel Making Trends

IT seems to us that there has always been, in this country at any rate, a certain looseness in definition of the fields of operation of electrode arc and high-frequency induction furnaces compared with the scope of fuel fired furnaces, particularly the open hearth furnace. But it has been fairly widely understood all along that the arc furnace has been confined in use to the making of the higher grades of steel and that its employment in producing the lower carbon steels would be uneconomic.

In a recent lecture in Sheffield, reported in last week's *Electrical Review*, Mr. J. C. Howard gave his impressions of recent visits to Canada and the United States and stated what seems to us to be a good case for the production of the lower grades of steel by means of the arc furnace. This case was made on the practical and technical side by giving examples of actual arc furnace installations which he had seen in construction and production in connection with the lower qualities of steel. To take just one example: there is an installation of two 22ft diameter furnaces, each with a 25,000 kVA transformer, making plain carbon steels for the production of wire and wire nails and working to two carbon specifications only.

A part of Mr. Howard's case was based on a report recently issued by the Battelle Memorial Institute on the " Comparative Economics of Open Hearth and Electric Furnaces for the Production of Low Carbon Steel," although the lecturer did not give details of this report. Actually it covers an investigation at Battelle sponsored by a group of fourteen electric utility companies and Bituminous Coal Research, Inc., into the present and potential competitive aspects of the electric and open hearth furnace processes for the production of plain carbon steels of 0·25 maximum carbon content.

Figures are given for both open hearth and electric furnaces for three classes of installations, representing output capacities of 250,000, 500,000 and 1,000,000 tons of ingots per annum. In the smallest group the capital cost for the open hearth furnace was $11·75 million as compared with $6·75 million for the electric furnace installations. The open hearth and electric furnace net production costs were $64·7 and $61·54 per ton of ingots. Favourable figures for the electric furnace are also given for the other two classes of installations.

While the report makes it clear that financial savings on the electric furnace are still not always great enough collectively to offset its much higher " fuel " costs the actual cost of metallics for the electric furnace is lower, largely because of its higher yield. All of this of course is based on American conditions and costs, but the case for this country was recently put to us by an authority on electricity supply for steel production. His main argument was the very much more favourable electricity tariffs nowadays in comparison with gas charges. Should the same trend towards the electric furnace set in in this country it would represent an enormous development.

SCOTTISH ELECTRICITY

Little real justification for the Electricity Reorganization (Scotland) Bill came out of the second reading debate last week. All the speeches were on purely party lines, albeit the political bias was clothed in technical and economic arguments. The measure is evidently designed to please Scottish separationists but the Scottish Labour members were unanimously against it and it is really difficult to see what advantages it offers to Scotland. One point made was that, with one exception, the South Scotland power stations needed modernization and the cost of this would fall heavily on the new Board. Some speakers suggested that there had been little or no consultation with the parties likely to be affected. All that Mr. Henderson Stewart, for the Government, could say to this was that the policy had been decided upon and then the B.E.A. and Boards were consulted. He could not say that the B.E.A. approved, he remarked, but that went without saying. As we foreshadowed in a leaderette a fortnight ago, Labour members expressed their fear that the Bill would result in the separation of Scotland from England in the matter of negotiation of conditions of employment. The Employees' National Committee of the Electricity Supply Industry is pursuing the matter.

IMPORTS FROM JAPAN

British manufacturers of the classes of goods included in the recent trade agreement signed by the British and Japanese Governments are naturally apprehensive of future possibilities. So far as the electrical industry is concerned only Japanese lamps and lighting fittings are involved and then only to a total of £50,000 for the year of the agreement. Taking the lamps (or " bulbs " as they are termed) the amount of the quota is £25,000. Though not up-to-date, the production figures included in the Monopolies Commission's report on the British lamp industry enable an idea of the relative importance of the quota to be gained. The total British production in 1950 was put at £13·2 million so that the permitted Japanese exports will represent a very small proportion of the whole. Low-voltage lamps account for £15,000 of the quota. The £25,000 worth of fittings which is to be allowed in is also a negligible amount in comparison with the total British production. It is not in the home market that British electrical manufacturers have to fear Japanese competition.

MOTOR RATINGS

An announcement recently attributed to the Canadian Electric Motor Manufacturers' Association was to the effect that soon new Canadian electric motors of up to 30 h.p. would have considerably higher output ratings (up to double was mentioned) for the same size of motor frame, as a result of intensive research in motor design. Many times we have seen in factories in this country the odd, generally fairly large, very old motor, nearly always in a dark corner and running under very poor conditions; and nearly always the works engineer's comment was something like: " Goodness knows what is on that old motor; it is a relic of the last century and it will take anything." Feeling a little suspicious of the claims made for the Canadian motors we referred the matter to an eminent motor designer in this country. He says that it has been well known for years that owing, no doubt, to N.E.M.A. standardization, manufacturers across the Atlantic have not used their materials so effectively as we have done. In fact, when standardization was considered here it was found that we could for the same power employ one frame size smaller than the Americans or Canadians. This was the equivalent of increasing the power available from a certain frame, usually in steps of 25 to 33 per cent. It should be regarded not as a way of increasing motor efficiency but of using materials to better effect.

INTEGRAL ELECTRONICS

For a long time there has been a tendency in some quarters to treat the subject of " electronics " as something quite apart from electrical engineering, instead of as a special branch of the broader subject. No doubt this has arisen from the earlier, closer, association of electronics with light current engineering, particularly in the field of communications, including sound and vision broadcasting. Nevertheless the drift apart of electronics from electrical engineering, particularly in the colleges and technical schools, is lamentable in the light of the fact that all branches of electrical engineering have their common roots in mathematics and physics. We were therefore glad to hear at the recent ceremony at King's College, Newcastle (University of Durham), reported in our last issue, the Rector, Mr. C. I. C. Bosanquet, M.A., announce that the College proposed to create a second Chair in the Electrical Engineering Department, which it was hoped would strengthen the heavy current and light current branches. It was the aim to find for this Chair a man who, although principally interested in electronics, was also interested in the application of electronics to heavy electrical engineering. It was also hoped that he would help in applying the new mathematical methods now becoming so important in both fields.

INTERFERENCE FROM RAILWAY

Statements regarding the interference with television reception caused by the electrified Lancaster–Morecambe–Heysham line have made it appear that the trouble was attributable to the 50 c/s (6·6 kV) system employed. The London Midland Region, British Railways, has denied that this is the reason. Tests have shown that the cause was discharges across small voids between conductor and insulator surfaces on the catenary supporting insulators. It is pointed out that this type of interference can occur with any high-voltage transmission line using pin-type insulators. The use of conducting grease on the insulators has been found effective in reducing interference, but consideration is also being given to the use of a special type of insulator.

Pottery Power Plant

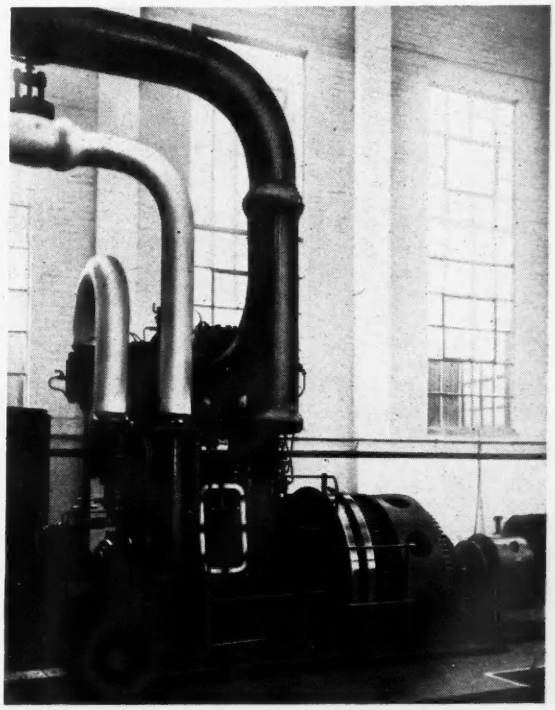
An Economical Arrangement for Steam and Electricity Supplies

NEW generating arrangements carried out at the Burslem works of Doulton & Co., Ltd., are expected to result in a marked improvement in operating efficiency and effect a considerable saving in the cost of fuel. The scheme adopted provides for the generation of electricity by means of back-pressure engines in accordance with the demand for process steam and arrangements have also been made to run in parallel with, and export surplus power to, the Midlands Electricity Board's system, from which supplies are also taken at certain periods.

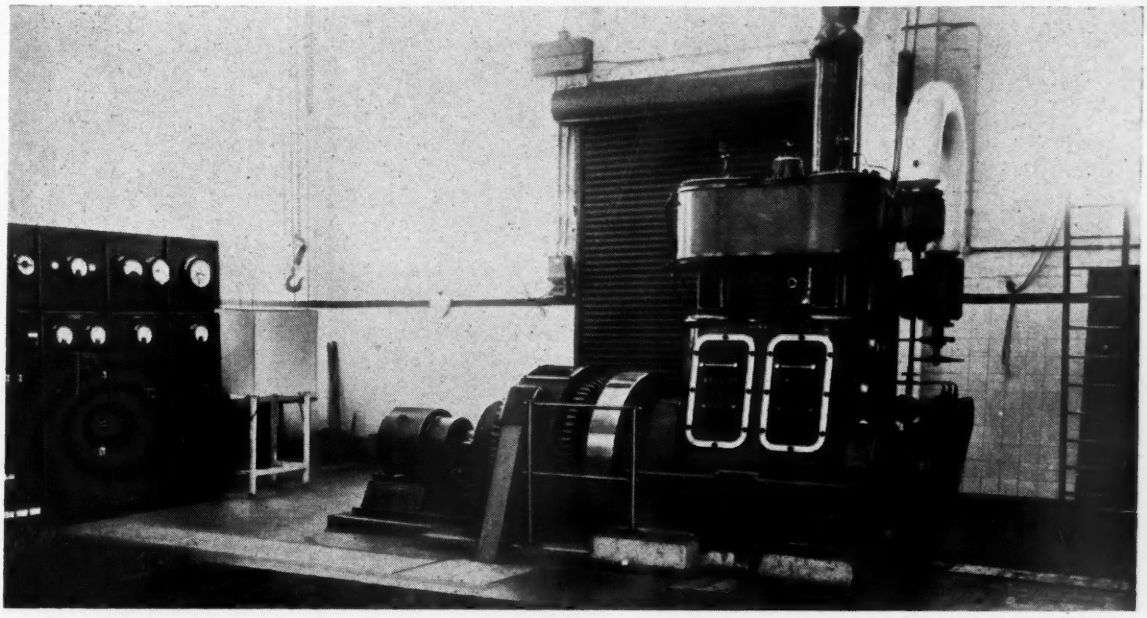
At present there are three generating units installed, two 300 kW and one 150 kW Belliss & Morcom reciprocating engines coupled to B.T.H. 400/215 V alternators. These sets operate with steam at a pressure of 200 lb/sq in and a temperature of 525 deg F and exhaust against a back pressure of 5 lb/sq in.

Arca control valves govern the supply of steam to the engines in accordance with the demand for low pressure steam in the works and they also maintain the pressure by a make-up supply through a reducing valve in the event of the amount of steam being inadequate for the process demands.

Before the new installation was carried out power was generated by eight steam engine sets, ranging in size from 8 kW to 150 kW and with a total capacity of 300 kW. They operated at a pressure of 90 lb/sq in under back-pressure conditions. In summer the demand for process steam was lower than the amount of exhaust steam available so that a considerable portion was discharged to atmosphere: in winter, despite increased power requirements,

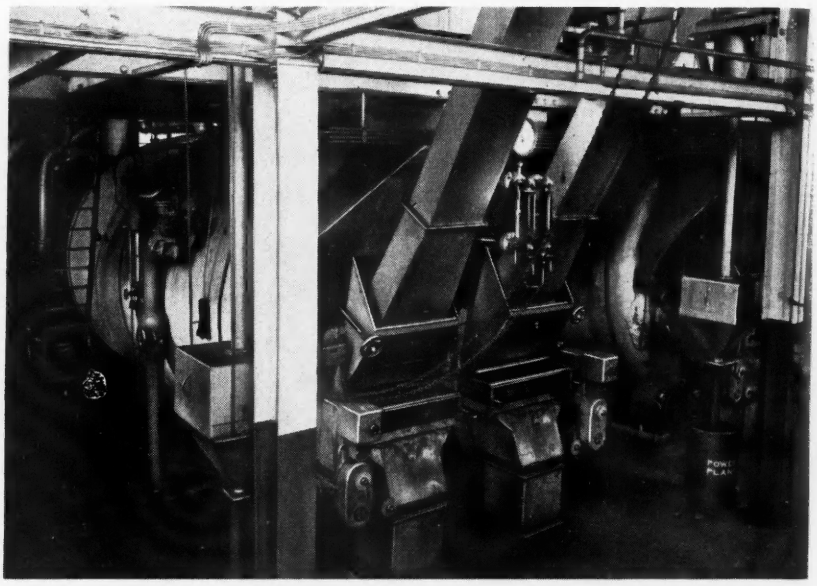


Above: The Belliss & Morcom–B.T.H. 300 kW set and (below) 150 kW back-pressure generating set



the demand for steam for process heating and space heating exceeded the supply and live steam had to be taken from the boilers, making it necessary to obtain additional power from the Electricity Board.

Apart from the replacement of these generating sets, the existing obsolescent boiler plant was replaced by new plant operating at the higher steam pressure required. This consists of two Edwin Danks "Economic" boilers fitted with superheaters in the combustion chambers. Each is rated at 12,500 lb/hr at a pressure of 225 lb/sq in, superheated to 550 deg F. "Oldbury" chain grate stokers, with ash extractors, are fitted and both forced and induced draught fans are provided, the latter being a Davidson "Sirocco" unit driven by a 25 h.p. motor. Donovan control panels govern the operation of these fans as well as that of the coal conveyor and elevator and the ash conveyor. Ronald Trist "Thermofeed" regulators with "Hilo" alarms control the boiler water level, "Mobrey" pump governors regulating the two Weir vertical feed pumps. Equipment of the boiler house instrument panel comprises a Cambridge feed water temperature recorder, Ether pyrometers for the combustion chambers, an Electroflo CO_2 recorder, and Bailey indicators and recorders for the steam flow, pressure and temperature.

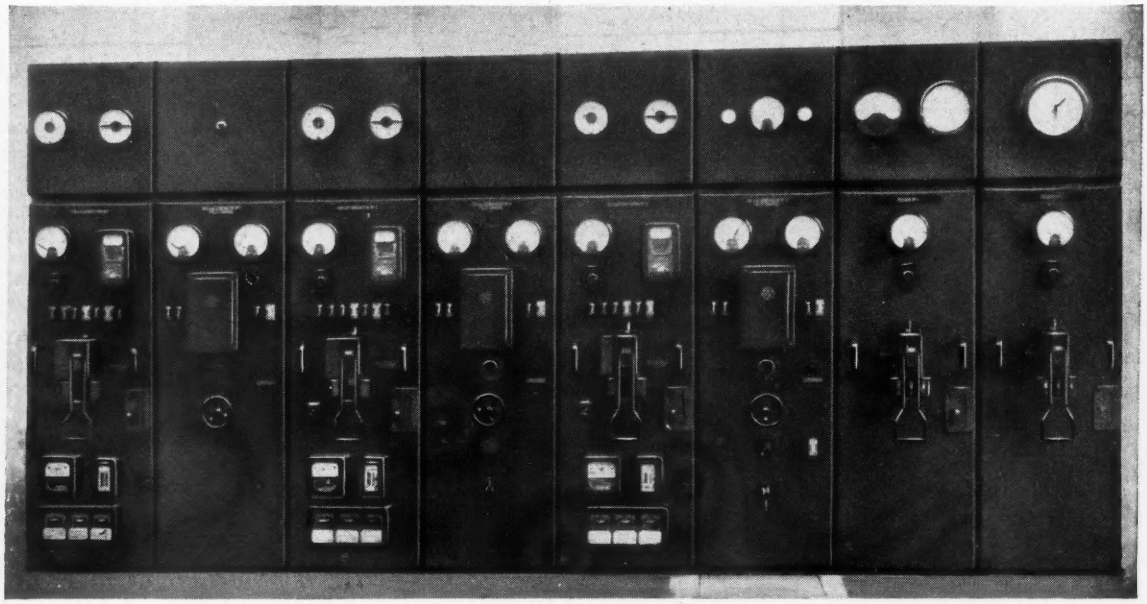


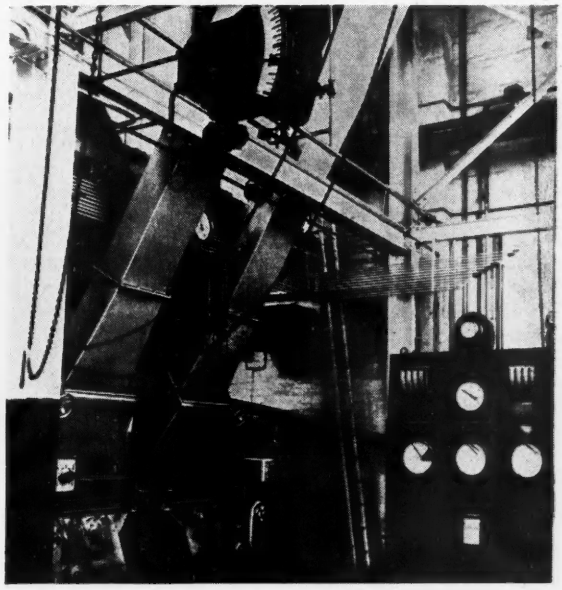
The 12,500 lb/hr 225 lb/sq in boiler

An extremely elaborate system of protection has had to be devised in connection with the motor paralleling method adopted for synchronizing the alternators with the M.E.B.'s supply. With this method of paralleling the set being synchronized is first run up to speed; its alternator circuit breaker is then closed on the live busbars, bringing the machine into step. The alternator does not start to generate until the field switch is closed. The steam supply to the engine is opened up and the field regulated to control the output current. The back pressure on the steam mains governs the power output by regulating the steam to the engines. During the starting-up period, a timing relay renders inoperative the reverse power relay on each set.

The supply from the alternators to the works is taken from two circuit breakers on the control panel—each breaker feeding to opposite ends of the busbars on the

The switchboard controlling both locally generated and public electricity supplies





Instrument panel in the boiler house

original main switchboard. The M.E.B.'s supply from two 500 kVA transformers is also connected to this switchboard, which can be divided into two sections by means of a busbar coupler.

Castell locks and auxiliary contacts on the main circuit breakers ensure that the correct sequence of operation is adhered to, and that paralleling can be carried out only at the alternator control panel. With this scheme only one key is used, and under working conditions it is trapped on the alternator control panel, where it maintains an auxiliary contact in the no-volt supply to the alternator circuit breakers. The other main circuit breakers require this key before they can be manually operated.

To enable the plant to be operated independently of the Board's supply, the incoming circuit breakers each have auxiliary contacts, which are closed in the off position of the breakers. These are connected in series with similar contacts on each alternator circuit breaker and the common no-volt circuit on the control panel.

Push-buttons provided on each alternator control panel enable any one of the alternators to be run up with its field switch closed and supply the no-volt circuit to enable its circuit breaker to be closed on to the busbars. When this circuit breaker has been closed, its auxiliary contacts will be in the open position, which makes it necessary to motor parallel the other set on to the busbars.

Mounted on the alternator control panel are a centre zero kVA meter and a power factor indicator. These are connected to the incoming supplies through a summation transformer. The kVA meter indicates the amount being taken from or fed back into the Board's mains. The power factor indicator enables the alternators to be used to correct the p.f. of the incoming supply. Two pilot lights fed from a separate section of the network indicate the occurrence of a power failure on the incoming mains.

With the exception of the variable speed d.c. drive on the chain grates, all motors for the boiler house auxiliaries are started from a combined starting panel on the firing floor. Plug circuits in both the boiler and power house for maintenance purposes are supplied at 230 V through a double wound transformer with earth leakage protection. Pyrotenax cable has been employed throughout the boiler house for both lighting and power.

At present the maximum demand is about 600 kW and in the first year of operation about 150,000 kWh was exported to the M.E.B. Under prevailing conditions of steam and power demands it is estimated that there should be a financial saving of approximately £7,000 per annum, based on an estimated economy of 30 per cent of the amount of coal used for steam raising and 60 per cent saving in the amount of electricity purchased from the public supply. Apart from the financial aspect the scheme has the additional advantage that both steam and power are under the control of a single operator, who does not need to be a skilled electrical engineer.

For assistance in the preparation of this article we are grateful to Mr. S. Hall, chief engineer, of Doulton & Co., Ltd., Burslem, and the staff of the Birmingham office of Powell Duffryn Technical Services, Ltd., who were the consulting engineers responsible for devising the scheme.

Rolling Stock for Manchester–Glossop Services

SUCCESSFUL preliminary trial runs took place recently with the first sets of multiple-unit stock for the Manchester (London Road)–Glossop electric services that will be introduced when the next stage of the British Railways Manchester–Sheffield–Wath electrification scheme comes into operation this year. Eight three-car trains, each consisting of a motor coach, trailer and driving trailer, are being provided for the Manchester–Glossop route. The electrical equipment has been supplied by the General Electric Co., Ltd., and the vehicles were built by the Metropolitan-Cammell Carriage & Wagon Co., Ltd.

Each motor coach is powered by four G.E.C. axle-hung, nose-suspended, self-ventilated traction motors with 1-hour ratings of 185 h.p. on full field and 210 h.p. on weak field. The system voltage is 1,500 V d.c., and the motors are connected in series pairs, with control by series or parallel connection of the two pairs in a motor coach. The electro-pneumatic contactor control equipment is underframe-mounted, and the whole of the electrical equipment has been designed for satisfactory operation over the fairly wide range of line voltage that may be encountered on this route, where regenerative braking will be used by electric locomotives working heavy goods trains over the lengthy gradients on the main line.

The motor coaches each seat fifty-two third class passengers, the trailers twenty-four first and thirty-eight third and the driving trailers sixty third. The coach bodies are of all-steel construction, each being fitted with two pairs of electro-pneumatically operated sliding doors with permissive passenger control. The coaches are warmed by 400 W heaters mounted beneath the seats.

Both sides of the triangular junction of the Glossop branch with the main line have been electrified and the trial runs have been made between Godley Junction and Glossop both direct and via Hadfield, with trains composed of one and two three-coach units.

POWER FROM ATOMIC ENERGY

London University Extension Lecture

THE following notes are extracts from a lecture delivered under the above title by Dr. F. E. Simon, C.B.E., F.R.S., as one of a series of London University extension lectures on atomic energy. Dr. Simon said that the first question which arose in discussing nuclear power was whether there were adequate supplies of fissile material. Uranium was not exactly a rare substance, but high grade ores were not plentiful. Lower grade ores were available in many parts of the world, but the extent to which these were worth mining would depend on the progress in the efficiency of methods of concentration and, of course, on how much money could be spent on the work. No definite figures could be given, but it was evident that if we had to depend only on the primary fissile material, uranium 235, we would not have enough for really large scale development. But uranium 238 could be burned up by the process of " breeding " which increased the effective amounts of uranium by more than a hundred times. Thorium could also be used in a similar way. Using this breeding process then, the uranium and thorium reserves would be ample for the large scale use of nuclear power.

Cost of Nuclear Power

It seemed quite futile to try to predict the cost of nuclear power at the present moment with any degree of certainty. No nuclear power reactor had yet run for a reasonably lengthy period of time, and until a nuclear power plant had been in operation under realistic conditions for many years it would be quite impossible to give reliable figures.

It was possible, however, to find out whether we could reasonably expect the price of power to be not too far removed from that obtained from conventional fuels. We were lost without ample supplies of energy, but it seemed that the importance of their *cost* was being greatly exaggerated. Only about 3 per cent of the cost of industrial products was due to the power bill.

The cost of nuclear power would depend on the capital cost of the plant and its life, on the running expenses, and on the cost of the fuel. The capital cost of a nuclear power system at the beginning was bound to be considerably higher than that of a conventional power station. The cost of the fuel would probably be relatively insignificant, but very little could be said about the running expenses. However, from the relatively smooth operation, up to now, of the existing low temperature piles one could extrapolate that they might not be excessive after the development period. Thus, although the cost of " nuclear electricity " would at first be higher than that of " coal electricity " in America or Britain, it was quite possible that it would eventually come down to about the same level. That seemed to be sufficient reason for pushing on with the development of nuclear power.

Dr. Simon then said he would try to evaluate the effort needed to produce power reactors and the probable time scale for developing enough nuclear power to make a considerable contribution to our power supplies. In the first lecture of the series Sir John Cockcroft had brought home the fact that there was not simply one way to explore, but that many different types of reactor were possible. They differed in the choice of moderator, of cooling agent and of the concentration of fissile material. Some of them could work with natural uranium, others with uranium enriched with U 235 or plutonium.

One type of reactor would become particularly important for large scale power production, the *fast reactor* to which Sir John alluded in passing; one might compare it with an atomic bomb running under controlled conditions. This reactor would work without any moderator at all, and thus would be very favourable from the point of view of neutron economy. It would make possible the process of breeding. The process was called breeding because for every disintegrating plutonium atom more than one atom was produced from the uranium 238. In this way it would be possible to utilize the whole of the uranium and that meant that we would have enough nuclear fuel available to make large scale power production worth while for really long periods.

It was thus necessary to distinguish between various categories of power reactors. First, there were those built solely for the purpose of producing power; then those reactors which, using U 235 as fissile material, converted some of the U 238 into plutonium—these were called power convertors; finally, others, starting with plutonium, produced more plutonium than they burnt up, and produced power at the same time; these, the power breeders, would be the ultimate aim of the nuclear engineer.

In order to get a high thermodynamic efficiency the reactors must be run at temperatures as high as possible; that meant it was necessary to find materials which, besides being acceptable from the nuclear point of view, would stand up to the combined effects of irradiation and high temperatures. Again, the plant was made more complex by the fact that once a pile had been started some parts of it became highly radioactive and could never be approached, and so the plant had to be run by remote control. Thirdly, it was necessary to remember that so far we could not build power piles on a small scale; the cost of even the smallest unit would be millions of pounds. As this naturally restricted experimentation, much more careful planning beforehand was called for than in the design of ordinary, non-nuclear, machinery. Finally, the whole pile had to be designed in such a way that it was perfectly safe, and this meant not only that the people who ran it had to be protected against the special hazards, but also that the pile could not in unfavourable circumstances become unstable and blow up. Nuclear power stations which had to be put very far away from inhabited areas would lose a great part of their usefulness.

Radio Receiver Characteristics.—B.S. 2065 : 1954, " Glossary of Terms for the Electrical Characteristics of Radio Receivers " (British Standards Institution, 2, Park Street, London, W.1, price 6s), defines these characteristics in a form permitting the standardized measurement and description of their performance. It does not specify the methods of measuring the defined quantities, and although a method of measurement may be implied in a definition, any method may be used provided the defined quantity can be deduced, directly or indirectly, from the observations.

The definitions are expressed in a generalized form so as to be applicable to many types of receivers. They do not, however, cover all characteristics of certain special types such as diversity receivers. The standard is based on a report of a panel of the Inter-Services Radio and Electronic Measurements Committee.

Cleaners and Polishers

IN our Special Domestic Issue on 16th October we gave in tabular form detailed descriptions of seven of the principal electrical appliances: cookers, thermal storage water heaters, fires, convection heaters, refrigerators, washing machines and wash boilers. With the increased scope provided by our larger sized issue we are now in a position to extend our survey to cover fully other classes of equipment, which were not dealt with in detail.

To-day particulars are given of two appliances high up in the list of eliminators of drudgery in the home, vacuum cleaners and floor polishers. The attributes of the former are too well known to need comment, but the advantages of the floor polisher for those who have considerable expanses of floors, not to mention tables and certain other furniture, to keep clean are only just beginning to be appreciated.

As will be seen from the schedules below, both cylindrical type vacuum cleaners and floor polishers are almost invariably supplied with a complete set of accessories, though in some cases such items as special brushes, swivel nozzles, de-mothers, sprayers, etc., may be extras. With the upright type of cleaner, however, accessories are almost always available only as extras.

VACUUM CLEANERS

Manufacturer:	British Vacuum Cleaner & Eng. Co. ("Goblin")					Bylock
Name or model	G.29	G.39	G.59B	"Wizard" G.31	"Regal" G.38	"President"
Type	Cylinder	Cylinder	Cylinder	Upright	Upright	Cylinder
Motor	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.
Special features	Sanitising device, "holdfast" coupling, agitator nozzle	Foot-operated switch, swivel coupling	Extra powerful suction, swivelling agitator nozzle, foot switch	Conversion for upholstery, etc., by detaching handle	Dust finder headlight, beater brush, height adjuster	De-mothing tool, spray gun
Accessories	Upholstery and carpet tool, wall and dusting brush	As G.29	As G.29	Upholstery and carpet tool, wall and dusting brush	Crevice tool, upholstery tool, wall brush, ext. tube	Various brushes and nozzles
Finish	Nickel plated, red leatherette cylinder	Chrome plated, blue leatherette cylinder	Chrome plated, red leatherette cylinder	Black Bakelite, polished metal, maroon bag	Lustre bronze, rust bag	Chromium and blue hammered metal
Price (excl. P.T.)	£14 12 2 incl. accessories	£16 10 0 incl. accessories	£18 18 0 incl. accessories	£14 12 2 incl. accessories	£16 16 0	£15 15 0 incl. accessories
Price of accessories (excl. P.T.)	—	—	—	—	£2 18 6	—
Purchase tax	£5 5 6	£5 19 1	£6 16 5	£5 5 6	£6 1 4	£5 15 3
P.T. on accessories	—	—	—	—	£0 10 5	—

Manufacturer:	Bylock			Brown Bros. ("Duco")		
Name or model	"Centurion"	"Classic"	"Minivac"	"Junior"	"Super Silent"	Hand cleaner
Type	Cylinder	Cylinder	Hand cylinder	Cylinder	Cylinder	Hand
Motor	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.
Special features	—	—	Lightweight	—	Shrouded motor	—
Accessories	Brushes and nozzles	Brushes and nozzles	Brushes and nozzles	Complete	Complete	—
Finish	Chromium and oyster green hammered metal	Sprayed with plated end caps	Dimenso and chromium	High grade leather cloth	High grade leather cloth	Painted or oxidized
Price (excl. P.T.)	£13 7 6 incl. accessories	£8 19 6 incl. accessories	£6 10 6 incl. accessories	£7 19 6 incl. accessories	£11 19 0 incl. accessories	£6 0 9
Purchase tax	£4 17 11	£3 5 6	£2 7 0	£2 17 6	£4 6 3	£2 3 6
P.T. on accessories	—	—	—	—	—	—

Manufacturer:	Brown Bros. ("Duco")		R. Cadisch & Sons	C.W.S. ("Dudley Electric")		
Name or model	"De Luxe" hand	"Major"	"Cadison"	"Popular"	"Junior"	
Type	Hand	Upright	Cylinder	Upright	Cylinder	
Motor	⅛ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.	
Special features	—	Motor driven brush	Swivel hose connection	—	—	
Accessories	Complete	Complete	Oval brush, crevice and carpet nozzles	Standard	Standard	
Finish	Painted or oxidized	—	Black dice with black leatherette end caps	Oyster green	Red leatherette	
Price (excl. P.T.)	£6 13 4 incl. accessories	£11 14 0	£8 10 9 incl. accessories	£11 2 6	£8 5 0	
Price of accessories (excl. P.T.)	—	£3 3 0	—	£3 0 0	£1 17 6	
Purchase tax	£2 8 1	£4 4 5	£3 4 1	£5 11 3	£4 2 6	
P.T. on accessories	—	£0 11 10	—	£0 14 1	£0 6 6	

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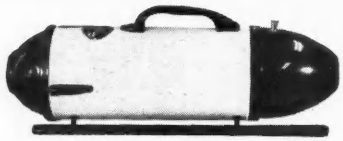

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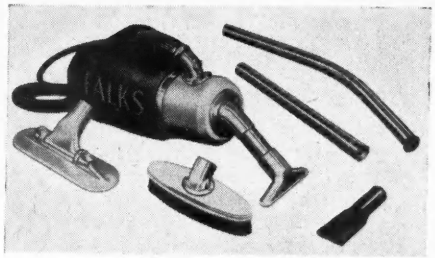

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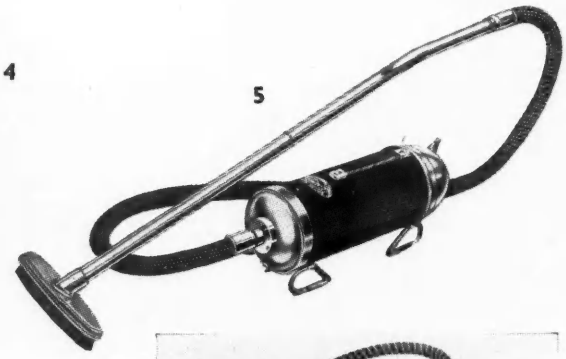

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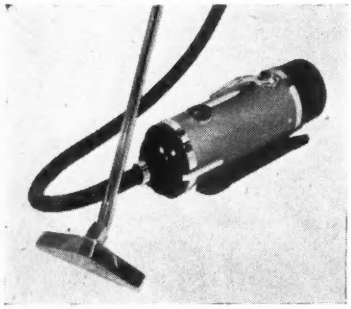

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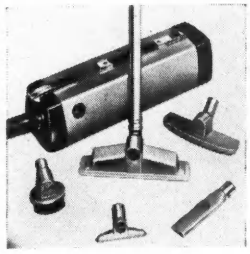

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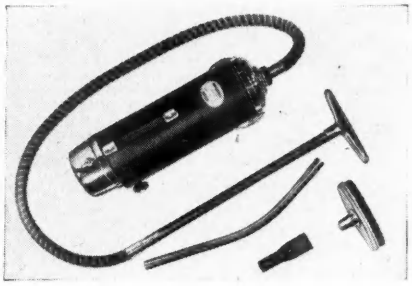

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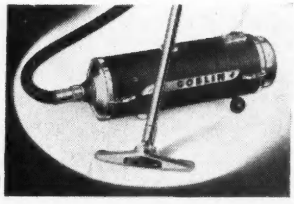

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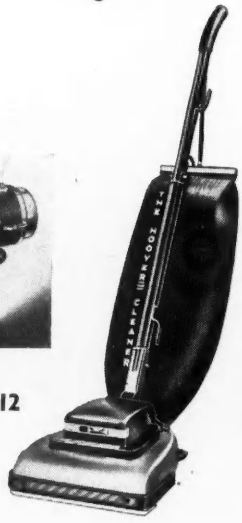

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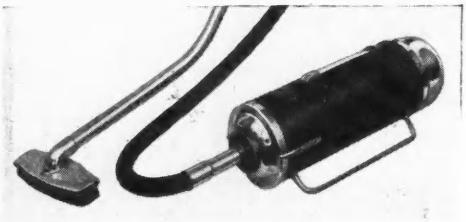


14

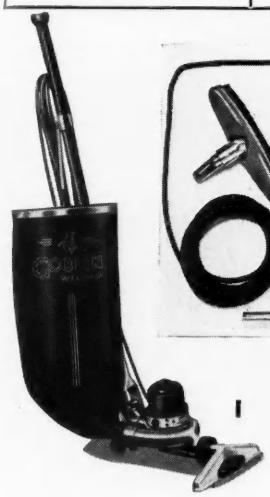
(1) Nash "Quikavac." (2) Thor 56. (3) Falk, Stadelmann "Playfair." (4) Thor 46. (5) Express. (6) Vactric W.202. (7) Hoover 417. (8) Cadisch "Cadison." (9) G.E.C. DM370. (10) C.W.S. "Dudley Popular." (11) "Goblin" G.39. (12) Hoover 612. (13) Vacuums "Bustler." (14) C.W.S. "Dudley Junior"

VACUUM CLEANERS . . . . . *continued*

Manufacturer:	Electrix				Electrolux
Name or model	" Halcyon "	" Swiftclean "	" British-Electrix "	" Nu-Electrix "	55
Type	Cylinder	Cylinder	Cylinder	Cylinder	Cylinder
Motor	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.
Special features	Foot switch	Foot switch	Foot switch, skid for use on stairs	Foot switch	Foot switch, hose coupling, air purification pad
Accessories	Hose; two extension tubes; furniture and swivel-carpet nozzles; rubber covered floor, wall and dusting brushes; tufting tool				Full set, including sprayer
Finish	Leathercloth with painted end caps				French grey " Pegmond," black Bakelite end pieces
Price (excl. P.T.)	£11 19 6 incl. accessories	£9 19 6 incl. accessories	£18 18 0 incl. accessories	£13 6 0 incl. accessories	£21 0 0 incl. accessories
Purchase tax	£3 18 0	£3 4 10	£6 2 11	£4 6 5	£7 13 6

Manufacturer:	Express	Falk, Stadelmann	Fillerys	G.E.C.	
Name or model	" Express "	" Playfair " 95638	" Step-Up " 254	DM.310	DM.370
Type	Cylinder	Hand	Cylinder	Cylinder	Upright
Motor	½ h.p.	½ h.p.	½ h.p.	½ h.p.	½ h.p.
Special features	Lightness	Extension tube, swivel carpet attachment	" Stair climbing "	All metal	Automatic nozzle adjustment
Accessories	Full set	Full set including swivel carpet nozzle	Full set including de-mother and sprayer	Full set	Full set
Finish	Black leather and chrome	Stove enamelled motor nousing, plated tubes and tools	Silver-grey plastic leatherette, enamelled end caps	Grey and maroon stove enamel	Natural aluminium, with blue bag
Price (excl. P.T.)	£11 0 0 incl. accessories	£8 12 6 incl. accessories	£18 18 0 incl. accessories	£14 14 0 incl. accessories	£16 16 0
Price of accessories (excl. P.T.)	—	—	—	—	£3 14 0
Purchase tax	£4 2 6	£3 4 9	£6 1 3	£5 7 5	£6 2 10
P.T. on accessories	—	—	—	—	£1 7 0

Manufacturer:	Genwind	Hoover				
Name or model	" One Hand "	612	912	119	417	100
Type	Hand	Upright, standard	Upright, heavy duty	Upright, Junior	Cylinder	" Dustette " hand
Motor	½ h.p.	½ h.p.	½ h.p.	⅒ h.p.	½ h.p.	⅒ h.p.
Special features	—	Agitator with brushes and beater bars, dirt finder lamp		Agitator with brushes and beater bars	" Disposall " dust bag, swivelling carpet nozzle with adjustable brush	—
Accessories	Straight and bent tubes, nozzles, 7in oval brush	Full set	—	Full set	Full set	—
Finish	Black wrinkle and chromium	Maroon enamelled metal parts with plastic mouldings				
Price (excl. P.T.)	£6 0 0	£22 5 0	£25 0 0	£16 0 0	£16 16 0 incl. accessories	£7 7 0
Price of accessories (excl. P.T.)	£1 1 0	£4 0 0	—	£2 18 0	—	—
Purchase tax	£2 5 0	£8 6 11	£9 7 6	£6 0 0	£6 6 0	£2 15 2
P.T. on accessories	£0 4 4	£0 9 9	—	£0 8 11	—	—



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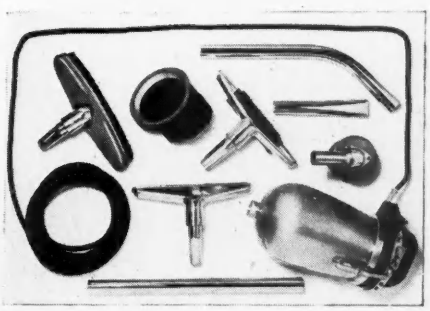

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(1) " *Goblin Wizard.*" (2) " *Jifextra* " (*Water Softener and Vacuum Cleaner Service*). (3) *Electrolux 55.* (4) *Vactric R.53*

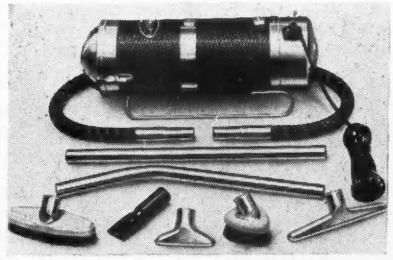
VACUUM CLEANERS . . . . . *continued*

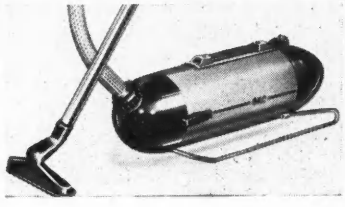
Manufacturer:	Hotpoint	Morphy-Richards	Nash	Phœnix Sales	
Name or model	411	VC/81	" Quikavac "	" Popular "	" Gloria "
Type	Upright revolving brush	Upright	Upright	Cylinder	Cylinder
Motor	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.
Special features	Foot switch, dust bag with inner air sleeve	Adjustable rotary brushes	Lightness	—	—
Accessories	Complete	Full range	Complete	Full set. Extras: swivel nozzles, sprayer, etc.	
Finish	Grey and maroon	Chrome and stove enamel, blue, maroon or green	Green enamel	Nickel metal parts, leatherette body	Nickel metal parts, leatherette body
Price (excl. P.T.)	£12 19 6	£16 16 0	£11 0 0 incl. accessories	£7 12 8 incl. accessories	£8 4 8 incl. accessories
Price of accessories (excl. P.T.)	£3 0 0	£3 3 0	—	—	—
Purchase tax	£4 14 11	£6 3 6	£4 2 6	£2 17 3	£3 1 9
P.T. on accessories	£0 9 0	£0 10 6	—	—	—

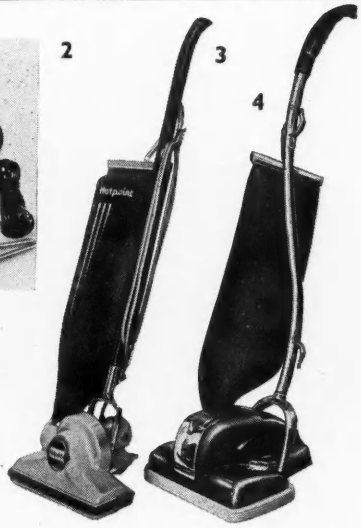
Manufacturer:	Phœnix Sales				Tellus	
Name or model	" Major "	" Clipper "	" Jet Power "	" Power Flo "	R.40	S.55
Type	Cylinder	Cylinder	Cylinder	Cylinder	Canister	Canister
Motor	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.
Special features	—	—	—	—	Hygienic metal dirt container	
Accessories	Full set. Extras: swivel nozzles, sprayer, etc.				Complete	Complete
Finish	Nickel metal parts, leatherette body	Chromium metal parts, leatherette body	Chromium metal parts, blue body	Lizard skin with maroon Bakelite end caps	Polished alloy	Polished alloy
Price (excl. P.T.)	£9 1 4 incl. accessories	£9 18 6 incl. accessories	£12 4 4 incl. accessories	£11 9 1 incl. accessories	£22 10 0 incl. accessories	£26 5 0 incl. accessories
Price of accessories (excl. P.T.)	—	—	—	—	—	—
Purchase tax	£3 8 0	£3 14 5	£4 11 8	£4 5 11	£8 10 0	£9 18 4
P.T. on accessories	—	—	—	—	—	—

Manufacturer:	Thor Appliances		Vactric		Vacuums
Name or model	Model 46	Model 56	W.202	R.53	" Bustler "
Type	Upright	Cylinder	Cylinder	Upright	Upright and hand
Motor	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.	⅓ h.p.
Special features	Light-weight, revolving brush	Twin-fan action, press button foot switch	Foot switch	Agitator	Lightness (7½ lb)
Accessories	Full range	Full range	Full set including demother	Full set including demother	Extension tube, round and oval floor brushes and crevice nozzle
Finish	Cream enamel, maroon bag	Cream and maroon stove enamel	Rexine	Dimenso	Cream enamel and polished aluminium
Price (excl. P.T.)	£13 15 0	£11 15 0 incl. accessories	£19 15 0 incl. accessories	£15 15 0	£13 1 8
Price of accessories (excl. P.T.)	£3 17 6	—	—	£3 15 0	£2 12 0
Purchase tax	£4 11 8	£3 18 4	£6 6 9	£5 1 1	£4 13 10
P.T. on accessories	£0 12 11	—	—	£0 12 1	£0 5 4

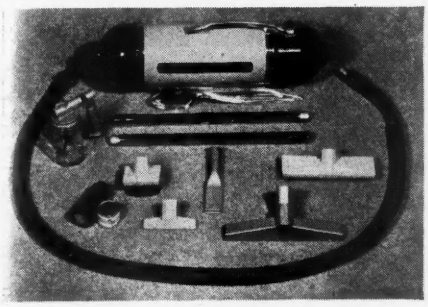
Manufacturer:	Water Softener & Vacuum Cleaner Service
Name or model	" Jifextra "
Type	Hand with extension tools
Motor	½ h.p.
Special features	Light-weight
Accessories	Complete
Finish	Crackle enamel and chrome
Price (excl. P.T.)	£11 5 6 incl. accessories
Price of accessories (excl. P.T.)	—
Purchase tax	£4 4 6
P.T. on accessories	—







(1) G.E.C. DM.310. (2) Brown Bros. "Duco Super Silent." (3) Hotpoint 411. (4) Morphy-Richards VC/81



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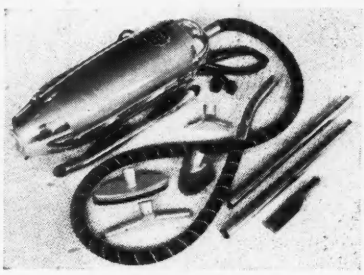

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(1) *Fillerys "Step-Up."* (2) *Phœnix "Jet Power."* (3) *Brown Bros. "Duco De Luxe" hand cleaner.* (4) *Bylock "Classic."* (5) *Tellus S.55.* (6) *Bylock "President."* (7) *Electrona "Duplex 75" Type FSP.* (8) *Truvox "Juno."* (9) *Electrolux "Quiet Floor"*

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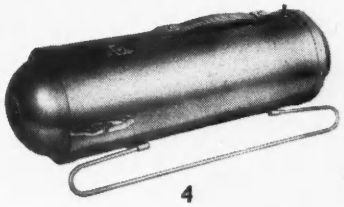

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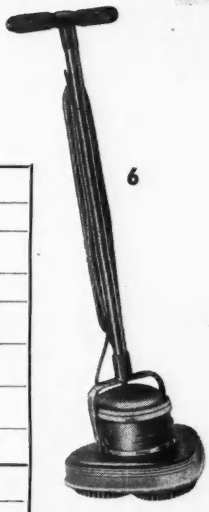

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FLOOR POLISHERS

Manufacturer:	Bylock Electric, Ltd.	
Name or model	430	"President" 532
Type	Three brush (two rotating)	Three brush
Motor	½ h.p.	½ h.p.
Special features	—	Floating brushes for uneven floors
Finish	Chrome and cream enamel	Wine and grey non-chip
Price (excl. P.T.)	£18 18 0 incl. accessories	£16 17 6 incl. accessories
Purchase tax	£6 18 2	£6 3 5

Manufacturer:	Electrix	Electrolux
Name or model	"Halcyon"	"Quiet Floor"
Type	Three brush	Three brush
Motor	½ h.p.	½ h.p.
Special features	Also suitable for use as scrubber	Triangular body for getting into corners. Hard and soft brushes, felt discs
Finish	Fawn hammer	Dark green hammer-tone, with black Bakelite and chromium handle
Price (excl. P.T.)	£14 14 0	£23 0 0
Purchase tax	£4 15 6	£8 8 2

Manufacturer:	Electrona Electrical Products ("Duplex 75")		
Name or model	S	F	FSP
Type	Light duty	Heavy duty	Dust extractor
Motor	½ h.p.	⅝ h.p.	⅝ h.p.
Special features	Compensated silent friction drive, wax spreader	Continuous running, wax spreader	Saves sweeping floor surface, wax spreader
Finish	Synthetic coral pink with chromium and black aluminium		
Price (excl. P.T.)	£28 9 6	£32 17 6	£42 5 0
Purchase tax	£10 5 7	£11 17 4	£15 5 0

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FLOOR POLISHERS . . . . . *continued*

Manufacturer:	Fillerys (Gt. Britain)	G.E.C.	Hoover	Truvox
Name or model	273	DM.340	—	"Juno" DP20A
Type	Three brush	Two brush	Two brush	Single brush
Motor	½ h.p.	½ h.p.	½ h.p.	½ h.p.
Special features	Light-weight, snap-on lambswool pads, scrubbing brushes	Robustness	Scrubbing brushes and lambswool pads	Polishes, buffs, sands and scours
Finish	Enamelled base and handle, plastic handle grip	Black enamel	Enamel with plastic mouldings	Chrome
Price (excl. P.T.)	£14 15 0	£19 10 0	£19 19 0	£18 18 0 (Sanding pack: £1 13 6 Scouring pack: £1 7 0 extra)
Purchase tax	£4 14 8	£7 2 7	£7 9 8	£6 18 3 (Sanding pack: £0 6 3 Scouring pack: £0 4 11)

Manufacturer:	Truvox	Vactric
Name or model	"Juno" DP20H	F.P.
Type	Single brush	Three brush
Motor	½ h.p.	½ h.p.
Special features	Polishes, buffs, sands and scours	—
Finish	Cream	Dimenso
Price (excl. P.T.)	£17 10 0 (Sanding pack: £1 13 6 Scouring pack: £1 7 0 extra)	£19 15 0
Purchase tax	£6 8 0 (Sanding pack: £0 6 3 Scouring pack: £0 4 11)	£6 6 9

(1) *Hoover.* (2) *Bylock 430.* (3) *Vactric F.P.* (4) *G.E.C. DM.340.* (5) *Fillerys 273*

LIST OF MANUFACTURERS

BRITISH VACUUM CLEANER & ENGINEERING CO., LTD., Goblin Works, Leatherhead.
BROWN BROS., LTD., Great Eastern Street, London, W.C.2.
BYLOCK ELECTRIC, LTD., South Street, Enfield.
CADISCH, R., & SONS, Red Lion Square, London, W.C.1.
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hale Street, Dudley.
ELECTRIX, LTD., Sterling Works, Dagenham.
ELECTROLUX, LTD., 153–155, Regent Street, London, W.1.
ELECTRONA ELECTRICAL PRODUCTS, LTD., Islington Mill, James Street, Salford, 3.
EXPRESS VACUUM CLEANER CO., 96, Bath Street, Birmingham, 4.
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.
FILLERYS (GREAT BRITAIN), LTD., 41, Sackville Street, London, W.1.
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.
GENWIND, Redhouse Farm Works, Bentley Heath, Knowle, Birmingham.
HOOVER, LTD., Perivale, Greenford, Middlesex.
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Peterborough.
MORPHY-RICHARDS, LTD., 121, Victoria Street, London, S.W.1.
NASH ELECTRICAL CO., LTD., 82, Snow Hill, Birmingham, 4.
PHŒNIX SALES, LTD., Winton House, St. Andrew Street, London, E.C.4.
TELLUS SUPER VACUUM CLEANER, LTD., 39, Sheen Lane, Mortlake, London, S.W.14.
THOR APPLIANCES, LTD., 64–66, Oxford Street, London, W.1.
TRUVOX, LTD., Truvox House, Exhibition Grounds, Wembley.
VACTRIC, LTD., 196, Sloane Street, London, S.W.1.
VACUUMS, LTD., Aldridge Road, Birmingham, 22B.
WATER SOFTENER & VACUUM CLEANER SERVICE, LTD., 248, Romford Road, London, E.7.

I.E.E. Wiring Regulations

Supplements for Cables and Caravan Installations

A SUPPLEMENT to the twelfth edition of the Regulations for the Electrical Equipment of Buildings has just been issued by the Wiring Regulations Committee of the Institution of Electrical Engineers. This takes account of the revised B.S. 7, "Rubber insulated cables and flexible cords for electric power and lighting," and B.S. 2004, "P.V.C. insulated cables for electric power and lighting." At the same time a memorandum entitled "Recommended Practice for Electrical Installations in Caravans" has also been published.

Effect of Cable Supplement

The Regulations which are affected by the new supplement are 307, 309–311, 315, 404, 405, 1306, 1308, 1309, 1311 and certain tables are provided with alternatives where B.S. 7 (1953) or B.S. 2004 cables are used. The main effect of all this is that cables conforming to the new standards are acceptable for the purpose of the I.E.E. Wiring Regulations with the following exceptions:—

(*a*) The use of parallel twin rubber or p.v.c. insulated flexible cords is not recognized. This is pointed out by a new clause, Reg. 1308 (B).

(*b*) Tough-rubber-sheathed flexible cords with further reduced thickness of rubber insulation may be used only with vacuum cleaners. Twisted twin flexible cords with thickness of rubber or p.v.c. insulation further reduced may be used only for pendant lighting fittings. The relevant Regulations in these cases are 307 (B) and (C) and 1308 (C).

(*c*) The use of twisted twin p.v.c. insulated flexible cord without colour identification of cores is not permissible according to Reg. 309. Here it states that the earthing lead or earth-continuity conductor in fixed wiring should be black, while in a flexible cord it should be green. Alternatively, in a three-core flexible cable other than a flexible cord, the earth lead may be white, but it must be further identified by a green sleeve at each end. In a d.c. system blue may be used instead of black for the negative or middle wire (Reg. 310), or for the earthed neutral in an a.c. system (Reg. 311).

Under the heading "Selection of Runs" the new Supplement points out that where p.v.c. cables conforming to B.S. 2004 (1953) are used no special precautions are required. However, a footnote draws attention to the need to keep p.v.c. cables to B.S. 7 (1946, revised) from conditions where deformation may occur if the temperature exceeds 135 deg F (Reg. 315). It is also pointed out that where flexible cords are used and the temperature is likely to exceed 135 deg F asbestos-roved cords complying with B.S. 1327 shall be employed, in accordance with Reg. 1309.

Where t.r.s. cable having a sheath of general-purpose compound based on natural rubber or heavy-duty natural rubber compound [see B.S. 7 (1953), Clause 24, types (*a*) and (*b*) or, for existing stocks of cable, B.S. 7 (1946, revised)] is installed where it may be exposed to direct sunlight, it shall be provided with a special protective covering. If this is incorporated in the cable during manufacture, it shall be in the form of a braid, but if applied subsequently, it shall be a treated tape (Reg. 404).

Regulation 405, which deals with the types of cables that may be installed in conduit, now excludes H.S.O.S. type cable having hard drawn conductors. A note has also been added calling attention to the remarks made in Codes of Practice on aluminium and zinc alloy conduit fittings.

In Regulation 1306 vulcanized-rubber and p.v.c. insulated cable conforming to B.S. 7 or B.S. 2004 are now recognized. The cable may also, if desired, be reinforced by such means as an internal or external catenary wire or strain cord.

Table 4 in the Regulations, which deals with the dimensions and resistance of solid and stranded conductors, is now provided with an alternative giving resistance values at 68 deg F instead of at 60 deg F. Table 16, which deals with flexible cables other than flexible cords, and also Table 17 on flexible cords, are similarly provided with alternatives based on the new temperature.

The new Tables 22 and 23 are perhaps of more interest as they set out the maximum numbers of cables of the new types which may be drawn into conduit. The change here is best illustrated by a few examples. For 1/·044 250 V grade cable 5, 7, 13 and 20 cables can be accommodated in $\frac{5}{8}$, $\frac{3}{4}$, 1 and 1$\frac{1}{4}$in conduits respectively, whereas the figures were previously 4, 6, 10 and 14. For 7/·029 250 V cable the figures are now 3, 4, 9 and 13, instead of 2, 4, 6 and 10. In the case of 660 V grade cables there is no change.

Apart from the supplement to the main Regulations, a shorter edition has also been drawn up to go with the Abridged Wiring Regulations and both are available from the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2, price 6d each, including postage.

Caravan Installations

In response to an approach by the National Caravan Council and inquiries from individuals, the I.E.E. Wiring Regulations Committee has investigated the application of the Regulations to trailer caravans using mains electricity supply. In so far as they apply the Regulations should be observed, but to clarify the position the memorandum mentioned at the beginning of this article has been issued. It deals with all the special aspects of caravan electrification and pays particular attention to the question of earthing. The arrangement of circuits and wiring is covered and it is emphasized that good workmanship is an essential requirement.

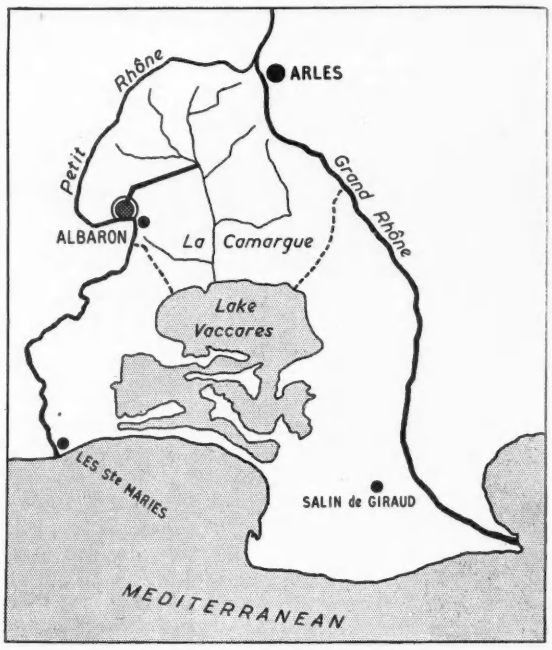
Certain types of lighting fittings and appliances are suggested as being particularly suitable for caravan installations and a recommended method of connection to the supply is described and illustrated. A warning is given against "amateur" modifications and extensions, and it is recommended that a notice "Instructions for Electricity Supply" be affixed near the main switch, giving instructions to the user regarding connecting and disconnecting procedure.

Copies of the memorandum are obtainable from the Institution of Electrical Engineers at the address given above, price 1s including postage.

Rural Electrification of the Rhône Delta

Sequel to a Land Reclamation Scheme

By DIANA ANLEY



La Camargue Triangle

BEFORE flowing into the Mediterranean in the southern part of France, the Rhône divides and becomes two rivers. The land between, an area of about 100,000 hectares and in the form of a triangle, is known as "La Camargue." Ruins, pottery, and Roman and Greek coins, which have been found on the banks of Lake Vaccarés in the centre, indicate the existence many years B.C. of important towns. Numerous Roman authors refer to it as the "granary of the Roman army." Saracen invaders destroyed the towns, but the land continued to be cultivated until the beginning of the nineteenth century. Then, to facilitate navigation of the Rhône and to avoid continuous flooding, the banks of the two rivers were built up and a wall constructed along the Mediterranean seafront.

In a climate which has a very low rainfall and where evaporation is intense the soil, being no longer naturally irrigated, became impregnated with seawater, and the surface encrusted with salt. Cultivation ceased, vegetation disappeared, and this once fertile land turned into desolate salt marshes.

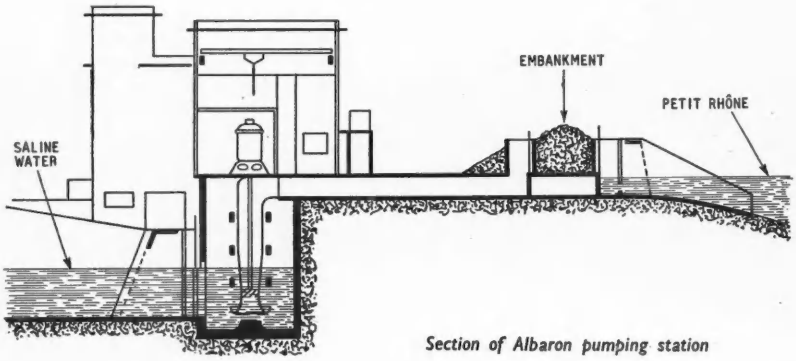
It was during the war, in 1942, that a band of hardy and courageous native agriculturists determined to try and reclaim La Camargue and place it under cultivation. This was due to the blockade of Indo-China and Madagascar and the impossibility of obtaining rice from abroad. After many delays 70 tons of seed were obtained and the struggle commenced. A small beginning was made with 350 hectares of land turned into rice fields. By 1951, this had been increased to 18,000 hectares. To-day, the seed is sown by aeroplane; enough rice of many varieties is grown to serve the needs of the whole of France without importation. Three modern electrically operated rice factories have been built which dry, husk, bleach and polish the grain, then pack it ready to deliver to the consumer.

To keep this delta land fit for cultivation, two methods must be employed—drainage and irrigation. Saline water is evacuated and emptied into Lake Vaccarés, which is the lowest lying part of the triangle. The original scheme relied mostly on gravity and was not entirely satisfactory, so it was decided to construct a modern electrically operated pumping station at Albaron on the left bank of the Petit Rhône. This was to connect up to the old drainage system by a new canal, 4,500 metres long, and, as an additional aid, salt water could be pumped into the Petit Rhône. This was completed and put into operation in 1950.

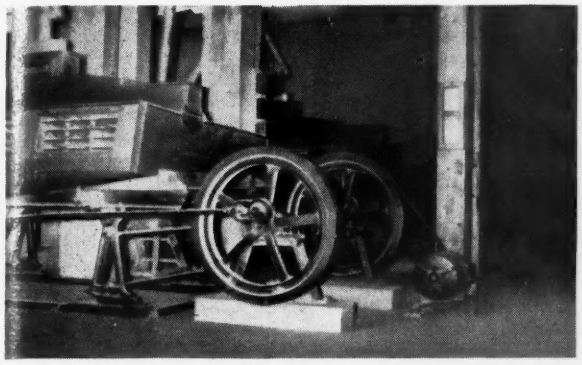
Albaron pumping station contains two vertical shaft Rateau 370 h.p. propeller pumps, supplied by the firm of Pompes Alta, Annecy, France. Power is furnished by a 700 kVA transformer. An auxiliary 30 kVA transformer and motor control panel are housed in the building.

Irrigation presents an easier problem. Fresh water is dispersed by means of pumping stations built along the two arms of the river Rhône. Power installed is in the region of 400 kW. Many diesel pumps now in operation will be replaced by electrically driven ones, as these have been found to give better service. Also, they will be more in balance with the powerful electrically driven evacuation pumps for saline water.

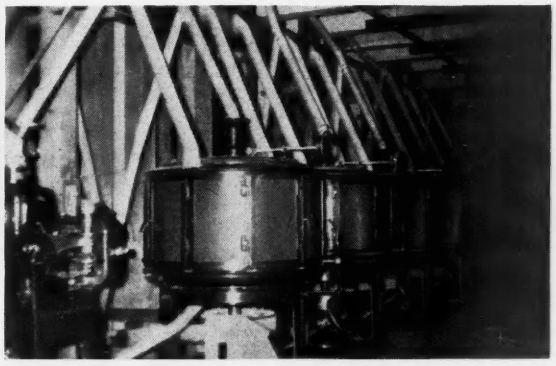
All this has meant carrying electricity into the area, and plans are now being pushed



Section of Albaron pumping station



Left: Machine for sorting grain at Pont de Cran.



Right: Husking machines installed by Olmia and made at Vercelli (Italy)

forward for the rapid development of rural electrification. The "Génie Rural" has asked for the closest co-operation of Electricité de France, and together they are studying the individual needs of rural farms. La Camargue grows not only rice, there also are vineyards and seasonal cultivation of arable land.

Under pressure of events, power installed has passed from 500 kW in 1939 to 3,500 kW in 1949 with a rapid upward trend. In the northern part of the delta, 5 km of high voltage and 40 km of lower voltage lines have been installed, with 250 rural subscribers. Eleven substations have been built at a cost of about 40 million fr. The area had first to be studied and mapped by aerial photography. The only map in existence dated back to 1834 and was practically useless as it did not give sufficient detail.

Thanks to the building of the André Blondel hydro-electric power station at Bolléne, by the Compagnie Nationale du Rhône, there is an assured supply of electricity available for the area at a reasonable cost. This station transmits to the national grid system at 220 kV, with a considerable part of the output distributed locally by the 150 kV and 60 kV networks. There is no doubt that this source of energy will greatly facilitate the rural development of the lower parts of the Rhône, including the valuable reclaimed land of its delta mouth.

Right: Drying apparatus

Below: André Blondel power station floodlit

Research in Agriculture

Evolving New Methods and Techniques

THE important part electrical and mechanical appliances could play in overcoming world food problems was stressed at the fourth National Power Farming Conference, which concluded at Cheltenham last night. Addressing the thousand farmers and engineers on Tuesday at the opening of the conference, which was organized by the *Power Farmer*, Dr. John Renny, who was recently appointed director of the Agricultural Engineers' Association, said that the population of the world was growing to such an extent that unless more intensive steps were taken to increase agricultural capacity there might not be enough food to go round. Agricultural engineers were aware of this problem and so, he hoped, were the farmers of the world. Together they must provide the means to carry on this task for much greater production.

Presenting a paper on "Research on Electricity in Agriculture" yesterday, Mr. P. Finn-Kelcey, deputy head of the Research Department of the Electrical Research Association and officer-in-charge of agricultural researches, pointed out that the main object of electrical research in agriculture was to evolve methods and techniques of using electricity on the farm which would be acceptable to the farmer and the supply authority. On the one hand, the farmer wanted robust appliances, safe, simple, needing little maintenance, and economic to buy and run. The supplier of electricity on his side liked to see the load spread as evenly as possible over the twenty-four hours or to see the farmer use the supply "little and often" rather than the reverse.

There was a classic example to illustrate the satisfying of both sides in the development of the 3 h.p. automatic hammer mill. Previously, farmers wanted a large 25 or 30 h.p. mill and motor to do the week's grinding in, say, four hours. For the price of the 30 h.p. motor alone, the small automatic mill and motor unit could now be bought and this would run without attention giving the same output, but in twenty-four to thirty-six hours' grinding.

The supply authority must always have available sufficient generating plant, overhead lines, etc., for the odd occasion when all its consumers seemed to switch on everything they had at the same time. A great deal of capital was tied up in such equipment and was obviously poorly invested, and this resulted in inflated overhead costs.

Three stages of research were generally necessary. First, a small-scale and closely observed trial; secondly, a larger set-up, still under the control of the investigators; and, thirdly, a full-size plant on a farm operated by the farmer with the minimum of guidance.

Grass Drying

To remove the furnace from a grass dryer (i.e. one drying unwilted grass) and substitute electric heaters was uneconomic in running costs, and these might well be £12 to £18 per ton dried. Such loads would also embarrass electricity suppliers in many districts. The first research approach to grass drying was to try out the American barn hay drying system under conditions in the British Isles. This process involved up to forty-eight hours' wilting and then the completion of the drying with unheated air. Results showed that, including depreciation of the plant, running charges and labour, costs were about £3 per ton dried when producing dried lucerne with 17 to 20 per cent crude protein. Since those earlier experiments, however, farm bank balances had increased substantially, and a figure of perhaps £10 per ton could be borne if the resulting product were of high enough feeding value, the throughput could be increased, and the wilting period eliminated.

Multi-Purpose Dryer

The research problem went farther, however, for they wanted this dryer to be a multi-purpose machine, to dry grass, wilted or unwilted, to dry grain, threshed or unthreshed, and to condition or dry seed crops as well. The same ventilating equipment should also be suitable for ventilating a ware or seed potato store and perhaps be used to promote chitting later in the season. Other suggested uses were drying the weekly wash and airing bedding.

They had carried out tests on the platform type of grain dryer and learned how the cost of drying could be reduced and how this dryer could be scaled up or down to suit various conditions. For seed growers further experiments were in progress to give them a foolproof system of drying as nearly akin to natural drying as possible. All the above crop-drying activities which were carried out on a farm scale were supported by various pieces of laboratory apparatus with which they could learn more of the finer points and the fundamentals of drying.

Dairying

The importance of adequate cooling of milk on the farm was now realized by all, as also was the necessity for heating water for washing utensils and udders, etc. In the first operation heat was taken from the milk and disposed of down the drain, while in the second fuel, in one form or another, was bought to heat the water. Experiments were going on now to see whether the heat extracted from the milk could be put to good use for heating water, and for this the heat pump principle was being used. This should result in a very substantial economy in operation, although first cost of the equipment might be higher than the present alternatives. The aim was to cool the milk to 50 deg F and heat the water to 130 deg F, and on paper this was quite feasible.

Poultry

A number of investigations had been made into the uses of electricity in poultry keeping. Artificial lighting, used to lengthen the winter day to thirteen or fourteen hours, substantially increased egg production during what was normally a period of egg shortage. The supposed reason for this increase was that the bird had a longer day, ate more food and, therefore, laid more eggs. This rather simple theory was now somewhat upset, for a similar increase was obtained by giving the birds a bright light, during the night, for a matter of seconds only; they now produced in an eight-hour day what they formerly did in fourteen hours: and seemed to thrive on it. A further problem being investigated was whether the air

conditions usually obtaining during the brooding period were the best that could be given to ensure maximum growth and development in the young chick.

The Electric Tractor

An electric tractor was a very attractive proposition. It was quiet, easy to control, did not suffer from cold starting troubles, needed no water cooling, did not require sump lubrication and was cheap to run. Past developments had usually resulted from a lack of other forms of fuel, war-time conditions, or the division of large tracts of land into equal-sized units. Their own approach had been to see whether they could evolve a cable-handling technique for a market garden tractor operating within a five-acre holding, the three essential conditions being that (*a*) one central supply point only was needed, (*b*) the cable was kept at least 3ft 6in from the ground for rowcrop work and (*c*) that the tractor might manœuvre in a completely unrestricted manner, anywhere on the holding. The E.R.A. arrangement satisfied these conditions and they had now been using such a tractor on their own holding for four or five years. A special cable had had to be evolved for this job and this was automatically paid in and out from a 30ft two-legged tower erected at the centre of the holding.

Weed Killing

Recently, a long-term research had been started to try out the plant- and weed-killing properties of electricity and this had opened up a considerable field of conjecture. Development might proceed along three lines. First, a light portable device that could be used for singling, thinning, or domestic gardening; next, a tractor-mounted outfit for inter-row cultivations, gapping, killing potato haulm, etc., and, lastly, a larger and more lethal equipment for use by contractors only, that might be used for eradicating bracken, etc., particularly from land that could not be tractor cultivated.

Horticulture

Horticultural researches were mainly centred on soil warming, soil sterilizing, glasshouse heating and artificial illumination of plants. Soil warming in frames for early salad crops was now accepted commercially and the pre-warming of glasshouse soil for twenty-four to thirty-six hours before planting out tomatoes had passed the experimental stage. Soil warming under cloches already showed that certain crops responded favourably to this treatment, notably bulbous flowers, and the use of similar electrical equipment on the propagating bench was worthy of commercial development. To what extent the minimum air temperature in glasshouses could be safely reduced, when soil warming was used, was the subject of further research.

Perhaps the most interesting work at present was in the lighting of tomato and cucumber seedlings for the first three weeks after pricking out. Approximately 150 seedlings in " sixty " pots were exposed to the light of a 400 W high-pressure mercury-discharge lamp for nine to twelve hours daily with the result that on an average each plant had produced an additional half a pound of fruit during early cropping.

Code for Farm and Horticultural Installations

THE Council for Codes of Practice for Buildings has issued in final form Code 325, " Farm and Horticultural Electrical Installations." It was drawn up by a committee convened on behalf of the Council by the Institution of Electrical Engineers, and the present publication is a revision of the draft previously issued for comment. It incorporates Head Code 325, " Farm and Horticultural Installations (General Aspects) " and Sub-codes 325.101, " Farm Consumers' Distribution "; 325.102, " Farm Wiring "; 325.103, " Farm Lighting "; 325.104, " Farm Heating Installations "; 325.105, " Farm Motive Power "; and 325.106, " Horticultural Installations."

The Code deals with the provision of electrical installations in and around farm buildings, nurseries, market gardens and private gardens, and is applicable both to new installations and to the modernization and extension of existing installations. It does not take the place of a detailed specification and the assumption is made that the work is carried out under qualified supervision. The Code is thorough-going in its scope and incorporates a valuable body of detailed information on modern practice.

The Head Code deals with the more general aspects of the subject. It points out the need for liaison at the planning stage between all parties concerned in order to determine the position of the main controls and the layout of the consumer's distribution in the light of the immediate applications proposed and possible future extensions. It surveys the operating conditions to which installations may be subjected and deals with earthing, battery charging and the provision of electric fences.

The first Sub-code is concerned with consumer's distribution by three systems: overhead distribution (including suspension systems), underground distribution, and distribution on walls and buildings. Detailed recommendations are made on the choice of routes and on the provision of service connections to buildings. The design, construction and maintenance of wiring installations are treated in Sub-code 325.102, where recommendations are made regarding the types of cables to be used and preference is given to the use of cables with insulating sheaths. The next Sub-code deals with lighting in and around farm buildings and sets out recommended illumination values for various positions and tasks.

The application of electric heating to milk, poultry and egg production, crop drying and pig rearing is considered in Sub-code 325.104. The section on milk production includes advice on water heating and steam raising, including thermal storage steam raising. The section on poultry and egg production deals comprehensively with incubating, hatching and rearing.

Sub-code 325.105 deals with the selection, control and installation of electric motors and their application to various drives. Recommendations are made on the types of motor suitable in various circumstances. The applications treated include water pumping, milk production, grain drying, grass drying, barn hay drying, hop drying, poultry and egg production, and fruit production.

The final Sub-code is concerned with distribution, wiring, lighting, heating (including soil warming) and motive power for nurseries, market gardens and private gardens. Advice is also given in regard to methods of space heating in glasshouses, mushroom houses, frames, etc., and on soil warming in glasshouses, under cloches, etc. The Code includes 17 diagrams illustrating overhead line arrangements and typical lighting, sterilizing and washing layouts. Diagrams of soil warming circuits are also included. Copies of the Code are available from the British Standards Institution, 2, Park Street, London, W.1, price 15s post free, reference CP325 (1953).

SCOTTISH ELECTRICITY BILL

Second Reading Debate

PARTICULARS of the Electricity Reorganization (Scotland) Bill were given in our 29th January issue. The second reading was moved in the House of Commons on 4th February by Mr. James Stuart, Secretary of State for Scotland, who outlined the provisions of the Bill. Its main object, he said, was to make the Secretary of State responsible for electricity matters in Scotland and to set up a new Board answerable to him for the generation and distribution of electricity in the South of Scotland. At present the South of Scotland Boards were responsible to the British Electricity Authority which, in turn, was responsible to the Minister of Fuel and Power. The Government had felt it right to review the existing arrangements in the light of experience and taking account of the views and wishes of many people in Scotland.

There would still be certain physical links with England, although relatively little electricity crossed the border in either direction. The Bill required the English and Scottish Boards to keep contact in matters of joint interest.

Former Secretary of State's Views

During the subsequent debate Mr. A. Woodburn, who was Secretary of State for Scotland from 1947 to 1950, said that the Bill changed the policy based on the McGowan Report. Had the Scottish manufacturers or trade unions been consulted? The House should be given reasons for the departure from the planning for the whole country of capital expenditure and the building of power stations. The Bill might jeopardize the development of the projected supergrid as a means of conveying electricity instead of coal from Scotland to England. He considered that the Bill would also break up trade union negotiations. The trade unions realized that in every case where wages were settled separately the Scots got less wages than the English.

Who was to provide the capital for the modernization of the many old Scottish power stations? Would the Scottish Board be given a free hand without any control from over the border? He suggested that the Bill was not produced for economic reasons but as a "little bit of window dressing."

Sir Ian Clark Hutchison believed that the measure would lead to the better development of rural electricity in the South of Scotland. He quoted Sir Norman Duke (chairman of the South East Scotland Electricity Board) as welcoming the prospects of an electrically independent Scotland.

Major W. J. Anstruther-Gray also thought that the Bill would improve the prospects of rural electrification in South Scotland but admitted that plans were already made to reinforce the 33 kV system in the South East Scotland Area. He read a letter he had had from the Electrical Contractors' Association of Scotland advocating autonomy for the Scottish Boards in the matter of salaries and wages, which suggested that these Boards could afford equal or better terms than the English ones.

Mr. A. M. F. Palmer said that the Bill was an extremely bad piece of legislation because it attempted to fit electrical development to a pattern primarily dictated by political expedience, in defiance of expert opinion. Scotland, with 1½ million kW of installed capacity, was to have "all the majesty of two separate, all-powerful, independent capital-raising authorities," while Eglnand, with an installed capacity of 16 million kW, was to remain with just one authority. There was no reason for dividing e.h.v. transmission at the border and it was ironical that these links should be severed at a time when engineers and technologists were drawing closer the electrical links between England and France.

Referring to the position of the North of Scotland Hydro-Electric Board, Mr. Palmer said that he was doubtful whether its isolation from the British Electricity Authority would add to the Board's financial stability. He also contended that the Bill broke down the wider conception of fuel and power planning.

Mr. Palmer further said that if the principle of national negotiation of wages and conditions were interfered with there would be extreme resentment throughout the trade unions in the electricity supply industry.

Mr. G. Nabarro welcomed the Bill as a desirable measure of devolution which placed responsibility for electricity in Scotland in the hands of a Scottish Cabinet Minister. He thought, however, that Scotland should have a single Board and that the Bill should empower the Scottish Boards to contribute towards the urgent task of railway electrification.

Mr. J. Taylor said that this was not a decentralizing Bill; it set up one Board for two existing ones. Moreover it did not decrease bureaucratic control for it created two new executives with undefined powers. Why abolish the existing Boards? The Bill would not produce one single extra unit of electricity; the present tempo of development would continue. At least one new thermal power station was needed in South Scotland. Was the cost to be borne by the Scottish sector of the industry?

In the further course of the debate similar arguments were put from both sides of the House. Sir Arnold Gridley expressed approval of the system of placing generating stations under the control of the distributing authority. He did not think that there would be any difficulty about the transmission of electricity over the border. He sympathized with the point made concerning the remuneration of staff and employees. There need be no undue anxiety about that but, if necessary, provision to deal with the matter could be incorporated in the Bill. On this point Mr. J. Rankin said that on the average Scottish weekly wages were lower than English rates.

Sir William Darling, speaking as the chairman of a Scottish electrical engineering enterprise, thought the suggestion that the measure would have a deleterious effect upon wages was absurd.

Government Reply

Mr. Henderson Stewart, Joint Under-Secretary of State for Scotland, replied to the debate for the Government and said, *inter alia*, that hon. members were wrong in thinking that the Scottish Boards would make separate arrangements with different sets of trade unions. The Bill provided for the maintenance of the existing agreement, although he agreed that in the future there might be a change. Dealing with the matter of consultation Mr. Stewart said that the Government decided on its policy and then consulted the B.E.A. and all the Boards and had gained great advantages from the discussions, although he was not saying that the B.E.A. approved.

In the division the second reading was passed by 285 votes to 255 and the necessary money resolution was approved.

PARLIAMENTARY REPORT

IN the House of Commons last week Mr. Nabarro asked the Secretary of State for Scotland whether he would give details of generating capacity in Scotland.

Mr. Stuart said that the aggregate capacity, excluding private generators, in the whole of Scotland at 1st January was 1,725 MW installed. Of this total capacity the amounts, in megawatts installed, in the two Scottish Divisions of the British Electricity Authority were 1,039 steam and 119 water; and in the area of the North of Scotland Hydro-Electric Board 127 steam, 399 water and 41 diesel.

Replying to a further question Mr. Stuart said he did not think he could usefully forecast the future maximum demand or the extent to which it would be met from Scottish supplies. Even at present the balance between supply and demand varied from day-to-day; on 25th January, for example, there was a deficiency of 35 MW. With regard to hydro-electric supplies, the North of Scotland Hydro-Electric Board had guaranteed 185 MW for this winter and next, but that figure might be increased.

Mr. Nabarro asked what was the amount of electricity exported to and imported from England during the calendar year 1953.

Mr. Stuart said that there was usually a simultaneous exchange of electricity between the two countries and to that extent gross figures might be misleading. He was informed, however, that in 1953, on the main transmission lines, 211 million kWh was sent from Scotland to England, and 237 million kWh from England to Scotland, giving a net import into Scotland of 26 million kWh.

Washing Machines

Mr. Crouch asked the Chancellor of the Exchequer why, when he made his recent reductions in purchase tax, he did not include electrically operated washing machines, particularly in view of their time- and labour-saving advantages to the housewife.

Mr. Butler said that this would involve singling out electrically operated washing machines from the wide range of electrical domestic appliances which were taxed at the same rate. He was aware of no sufficient reason for doing so.

Moriston Project

Major Anstruther-Gray asked the Secretary of State for Scotland if he would give the total estimated cost of implementing Scheme No. 23(B) of the North of Scotland Hydro-Electric Board, known as the Moriston Project, and what were the reasons for departing from Scheme 23(A).

Mr. Stuart said that Scheme 23(B), which had been submitted for confirmation, proposed a diversion of the Tomdoun-Cluanie Inn road along the south shore of Loch Loyne, estimated by the Board to cost £180,000; it was intended to replace the original proposal for a viaduct across Loch Loyne, estimated to cost £275,000. He understood that the Board's primary reason for the new proposal was its desire to reduce the cost of the scheme; but it also considered that the proposed diversion, though about six miles longer, would have better alignment and be less liable to blockage than the present road.

Commercial Television

Sir Leslie Plummer asked the Assistant Postmaster General whether the proposed new corporation to operate commercial television would itself be permitted to produce programmes in competition with the programme companies.

Mr. Gammans asked the hon. member to await the publication of the Television Bill.

North Hessary Tor

Replying to Mr. Astor, Mr. Gammans said that the B.B.C. estimated that it would cost from £200,000 to £250,000 to provide a television service from North Hessary Tor; only a small part of this sum would be incurred in making temporary arrangements in the first instance. The Corporation would be better able to estimate completion dates when the site had been purchased and the work of construction could begin, but the intention was to adhere if at all possible to the timetable originally planned, namely, to set up the temporary station within a year and the permanent station by the end of 1955.

Telegraph Service

Sir Herbert Williams asked the Assistant Postmaster General what was the total net loss to date since the telegraph service was nationalized; and which was the last year in which there was a surplus.

Mr. Gammans said that the answer to the first part of the question was £78 million, and to the second, 1871.

Radar for Aircraft

Mr. Teeling asked the Minister of Supply what was causing the delay in ordering radar and radio equipment for British aircraft; and what steps he was taking to co-ordinate the requirements of the R.A.F. and factories building aircraft for State civil air lines.

Mr. Sandys said he was not aware that there had been any avoidable delay in the placing of these orders.

Asked if he would look further into the matter, Mr. Sandys said that in the production of aircraft and electronic equipment new technical advances were being made all the time. The Ministry had tried to balance the advantages of earlier delivery against the advantages of incorporating some new development which had since been discovered in the industry.

Debate on Nationalized Industries

Mr. Crookshank, the Lord Privy Seal, initiating a debate on the nationalized industries, expressed Government approval for the appointment of the standing select committee to keep Parliament informed of the affairs of these industries.

He said that when the Bills setting up the nationalized industries were passing through the House the aspect of public accountability was left open. The Select Committee appointed in 1952 had recommended in its unanimous report the appointment of a standing select committee of the House, and suggested its terms of reference. The Government considered that it had to feel its way. Evidently there was ground for thinking that those who were most concerned with these industries were worried because they had not enough close contact with Parliament.

Mr. Herbert Morrison, on the other hand, favoured an inquiry once, say, in every seven years, rather than having a running inquiry by select committee of the House of Commons, and possibly one of the House of Lords. At least five days each Session should be devoted to debates in the House on the work of the nationalized industries.

The subsequent debate showed the majority of the House to be in favour of the setting up of a standing select committee.

Welsh Autonomy Claims

Mr. Gower asked the Minister of Fuel and Power whether, in view of the reasons which had led to the proposal to transfer the functions of the British Electricity Authority and also two Electricity Boards in Scotland from his department to the department of the Secretary of State for Scotland, he would now set up a committee, including Welsh experts, to investigate whether similar advantages would accrue from the setting up of a Welsh Electricity Authority and a Wales Electricity Board, having some measure of autonomy.

Mr. Geoffrey Lloyd said that the present organization for electricity in Wales was established for sound technical reasons, derived largely from geographical features which were quite different from those found in Scotland,

and he was not contemplating any changes.

Replying to another question of why it was that Scotland was going forward rapidly while in Wales they had to beg for any small concession, Mr. Lloyd said that the main difficulty was the great masses of mountains in Wales which made it uneconomic to distribute from north to south.

Mr. Palmer: Does not the Minister see that this question about Wales exposes the absurdity of the Scottish proposals?

Effect of Cold Weather

Lt.-Col. Lipton asked the Minister of Fuel and Power to what extent supplies of gas and electricity were adequate during the recent spell of cold weather; and to what extent load shedding was necessary.

Mr. Lloyd said that there had been record demands for electricity and gas all over the country. It had been necessary sometimes to reduce voltage or pressure but there had been only one small and short power cut which occurred as the system was taking up the steep rise in the load on Monday morning, 25th January.

Coal Stocks

Replying to Mr. Nabarro, Mr. Lloyd said that at 23rd January, 1954, total distributed stocks of coal were 16·7 million tons compared with 7·0 million tons on the comparable day in 1947. Stocks of coal held by power stations at the same dates were 5·4 and 1·3 million tons respectively.

New Bill

Mr. Gammans, Assistant Postmaster General, introduced the Post Office (Site and Railway) Bill, to enable the Postmaster General to acquire lands in London for the purposes of the Post Office and to construct for those purposes certain underground railway works in London. The Bill was formally read a first time.

Electrical Contracting Dispute

ELECTRICIANS employed in the electrical contracting industry in the Liverpool area remained on strike all last week but returned to work on Monday last. On that day, however, electricians in the Manchester district, said to number about 1,400, ceased work for the whole of this week. At the same time the strike of about 1,800 men at various sites has continued.

The E.T.U. has offered non-unionists in the industry strike pay if they cease work in support of Union members, but these men will be expected to join the Union. Strike pay is at the rate of 16s a day for skilled men, 14s for unskilled and 8s for apprentices, with additions of 4s for a wife and 2s for each child.

The Future of the B.I.F.

LAST week the text was published (H.M. Stationery Office, 3d) of the British Industries Fair (Guarantees and Grants) Bill introduced by the President of the Board of Trade on 3rd February. This empowers the Treasury to guarantee the principal and interest of loans made to British Industries Fair, Ltd., a company incorporated on 3rd February (see below). The maximum amount to be guaranteed is £100,000. A statement of a guarantee given is to be laid before Parliament immediately after it is given; and as soon as possible after June, 1959, an account of the total sums paid or due to be paid or sums received in repayment is to be presented to Parliament.

Clause 2 of the Bill provides for the Board of Trade to make grants towards expenditure incurred by the company in advertising the Fair. These grants may be as much as £100,000 per annum " but may be substantially less."

The new company, British Industries Fair, Ltd., referred to is a company limited by guarantee, without share capital. The original number of members is 100, each of whom is liable for £1 in the event of winding up. The objects are stated to be:—" To promote, organize and manage in London and elsewhere fairs, shows and exhibitions in connection with trade, industry and science, and in particular to assume the organization and management of the London section of the British Industries Fair hitherto organized and managed by the Board of Trade; to co-operate with the Birmingham Chamber of Commerce who manage the Birmingham section of the British Industries Fair."

The presidents of the Association of British Chambers of Commerce, the Federation of British Industries and the National Union of Manufacturers and the chairman of the General Council of the Trades Union Congress may appoint the chairman and four other persons to be directors; and the Presidents of the Birmingham Chamber of Commerce and the Board of Trade may each appoint one director. The first directors are not named. The solicitors are Messrs. Clifford-Turner & Co., 11, Old Jewry, London, E.C.2.

The arrangements follow recommendations made last year by a subcommittee of the Exhibitions Advisory Committee summarized in the *Electrical Review* of 4th December last.

Underwater Cable for Canada

BRITISH Insulated Callender's Cables, Ltd., has received an order valued at over $3,000,000 from the British Columbia Electric Co., for the supply and installation of some seventy-seven miles of 138 kV gas-pressure type cable. This cable will be laid across the Georgia Strait for transmission of power from the mainland to Vancouver Island to provide an adequate supply for future development. The cable route, to be determined more exactly by marine surveys this spring, will be somewhere between Greater Vancouver and a point south of Nanaimo on the Island of Vancouver where it will join the British Columbia electric system. This power scheme, due to be in operation in 1956, will transmit electricity underwater at a higher voltage and at a higher carrying capacity than any other similar installation in the world. The anticipated route includes continuous lengths of cables each approximately 17 miles laid under water at depths up to 600ft. Four single-core 138 kV cables will be required—three for regular use and one as a reserve—the circuit being able to transmit approximately 150,000 h.p. The weight of cable involved will be over 3,000 tons and special arrangements will be made for handling at both ends and shipping to site.

In the accompanying photograph Mr. W. H. McFadzean, deputy chairman and chief executive, and Mr. D. T. Hollingsworth, chief engineer, British Insulated Callender's Cables, Ltd., are shown discussing the details of the contract with Mr. Douglas Willis, of the B.B.C., during a recorded interview.

Mr. W. H. McFadzean (left) and Mr. D. T. Hollingsworth (right) being interviewed by Mr. Douglas Willis of the B.B.C.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

THE Minister of Fuel and Power has appointed **Mr. D. H. Kendon,** B.Sc.(Eng.), M.I.E.E., M.I.Mech.E., as chairman of the Merseyside and North Wales Electricity Board, with effect from 8th February, in succession to Mr. J. Eccles, C.B.E., M.M., B.Sc., M.I.C.E., M.I.E.E., M.I.Mech.E., who, as we have already reported, is now a deputy chairman of the British Electricity Authority.

Mr. Kendon, who is fifty-eight, has been deputy chairman of the Midlands Electricity Board since the nationalization of the industry in 1948. He studied at King's College, London, and in the 1914-18 war served in the Royal Engineers and the R.A.F. During his undergraduate days he began his career in the electricity industry with vacation work with Tilling-Stevens, Ltd., at Maidstone, Kent. In 1921 he became a junior engineer with Edmundson's Electricity Corporation and remained with the Corporation and its subsidiaries until nationalization. One of his early tasks was the supervision of the change-over from d.c. to a.c. in several towns in the Greater

Mr. D. H. Kendon

London area, and later he was responsible for the reorganization of the supply system in the Isle of Wight.

In 1934, after a period as assistant to the district manager responsible for the supply systems in the Isle of Wight and Guernsey, Mr. Kendon was appointed deputy general manager of the Cornwall Electric Power Co. and associated companies, becoming general manager a year later. During his five years in these posts a great deal of pioneer work was done in the sphere of rural electrification and development of the domestic load. In 1939 he was promoted to the general managership of Edmundson's largest subsidiary, the Shropshire, Worcestershire and Staffordshire Electric Power Company.

Among apparatus which Mr. Kendon has designed are an electrically heated hop dryer, which has been patented by the Midlands Board, and an electric heat storage cooker.

Mr. Kendon was chairman of the South Midlands Centre of the I.E.E. in its jubilee year, 1950-51. Three years ago the Birmingham College of Technology conferred upon him its honorary associateship.

Radio Rentals, Ltd., announces that **Mr. H. F. Hunt,** after being chairman since the incorporation of the company, has decided now to resign, and **Mr. P. Perring-Thoms** has been appointed chairman. **Mr. A. D. Smith,** F.C.I.S., has been appointed joint managing director and **Mr. J. Leslie Wilkie,** C.A., has been appointed a director.

Mr. G. T. Dickson, having recently resigned the chairmanship of the Association of Manufacturers of Electric Wiring Accessories after five years in that office, has ceased to be one of the A.M.E.W.A. representatives on the Electrical Fair Trading Council. Mr. Dickson's connection with the Council began in 1948 when he became a representative of the B.E.A.M.A. Accessories Section.

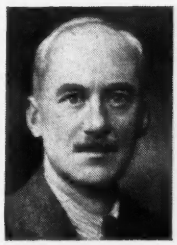
Mr. T. F. Roger, B.Sc., formerly of the British Thomson-Houston Co., Ltd., will join Stevenson & McGuffie, consulting engineers, Glasgow, as a partner from 1st March next.

Mr. G. Lloyd Jones has been appointed manager, Cardiff district office, of the British Thomson-Houston Co., Ltd., to succeed **Mr. A. F. MacCarthy,** M.I.E.E., who is retiring.

Mr. Lloyd Jones received his early training and technical education at Bangor, and after service in France during the 1914-18 war joined the B.T.H. (Rugby Works) for a special course of training, leading to a staff appointment as a commercial engineer in 1922. In 1926 he was transferred to the Middlesbrough district office, being appointed manager in 1936.

Mr. MacCarthy received his technical education at Manchester College of Technology and his early practical training at Harland & Wolff, Belfast. During the 1914-18 war he served in the Royal Engineers, after which, in 1919, he joined the staff of B.T.H. Manchester district office. In

Mr. G. Lloyd Jones

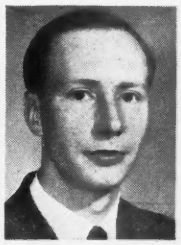


Mr. A. F. MacCarthy

1941 he was seconded for duty as deputy chief electrical engineer to A. V. Roe & Co., who at that time were employed in the aircraft expansion programme. At the end of the last war Mr. MacCarthy re-joined the B.T.H. Co., and in 1945 was appointed manager of the Cardiff district office.

Mr. D. R. Pigot, of the Sales Department at the head office of the Rheostatic

Mr. D. R. Pigot



Mr. J. M. McKenna

Co., Ltd., has been appointed manager of the Johannesburg sales office of its subsidiary company in South Africa, Contactor (Pty.), Ltd. Mr. Pigot received his engineering training at Faraday House, and after serving in the Royal Navy he was for some time with the Iraq Petroleum Co., and later the Electrical Apparatus Co. He joined the Rheostatic Co. in 1949, and for three years specialized in the design of unbreakable resistors.

Mr. J. M. McKenna, formerly in the head office sales department, has been appointed sales engineer to the northern area office at Manchester of the Rheostatic Co. Mr. McKenna was also trained at Faraday House, and before joining the company in 1952 was with the English Electric Co. at Stafford.

Sir Edwin S. Herbert, a director of Broadcast Relay Service, Ltd., has been appointed deputy chairman of the company. **Mr. P. Adorian,** a director, has been appointed managing director and **Mr. N. J. B. Sabine** has been elected to the board.

Mr. E. J. Larkin, A.M.I.Mech.E., M.I.Loco.E., has been appointed assistant mechanical and electrical engineer, Derby, British Railways (London Midland Region).

Mr. Larkin began his railway career in 1916 as a privileged apprentice in Derby locomotive works on the former Midland Railway, and gained his technical training at Derby Technical College. On completing his apprenticeship in 1921 he held various positions; he was appointed assistant works superintendent in 1940, and two years later became staff assistant to the chief

mechanical engineer of the former L.M.S. From its inception in 1943 Mr. Larkin has acted as chairman of the C.M.E. Sub-Committee. He has also been chairman of a number of policy committees set up under the British Railways organization for mechanical and electrical engineering. Mr. Larkin has been assistant mechanical and electrical engineer (acting) of the London Midland Region since December, 1952.

Mr. J. Eccles, deputy chairman (operations) of the British Electricity Authority, has been appointed a member of the Scientific Advisory Council in succession to Sir John Hacking.

The Minister of Fuel and Power has appointed **Mr. B. Pickup,** J.P., of Gatley, Cheshire, to be a part-time member of the North Western Electricity Board, and **Alderman E. A. C. Woodcock,** of Kettering, to be a part-time member of the East Midlands Electricity Board.

Mr. K. M. Johnston, managing director of Babcock & Wilcox, of Africa, is retiring from that position on 1st July but will remain a director. He will be succeeded by **Mr. J. S. Woosley,** assistant managing director, who has been closely associated with the establishment of the group's factory at Vereeniging, which is now in production.

Sir George Allen has been appointed secretary of the British Association for the Advancement of Science and takes office on 1st April, when the present secretary, **Mr. D. N. Lowe,** becomes secretary of the Carnegie United Kingdom Trust.

Miss Hazel Crompton, youngest daughter of the late Col. R. E. Crompton, recently visited the historic collection at the Chelmsford Works of Crompton Parkinson, Ltd. This collection forms a record of the early work of her father and his associates from 1878 to about 1904. The accompanying picture shows Miss Crompton interested in a 15 h.p. d.c. crane motor, installed when the new Crompton works opened in 1896 after the old works had been destroyed by fire. This motor ran until 1946 when it was removed for inclusion in the collection then being prepared. With Miss Crompton is Mr. A. V. Sowman (right), general manager of the Chelmsford Works and Mr. R. R. Godfrey (centre) who looks after the collection.

Mr. L. G. Moser (National and Local Government Officers' Association) has been appointed joint secretary (staff side) of the National Joint Managerial and Higher Executive Grades Committee, Electricity Supply Industry, in succession to Mr. H. Norton (Electrical Power Engineers' Association), who recently resigned from that position.

Mr. G. A. Moore, export manager to Premier Electric Heaters, Ltd., was appointed vice-chairman of the West Midlands Branch of the Institute of Export at the recent annual meeting.

The Twenty-Five Years Club of the **Pressed Steel Co., Ltd.,** held its dinner recently in the ballroom of the factory at Cowley, Oxford. Members of the Club consist of directors, executives, works and office employees who have been in the company's service for at least twenty-five years. At this year's dinner 100 qualified for membership, making a total of 328. Mr. A. L. Shuttleworth, managing director and founder member, presented silver enamel Club membership badges and gold watches to each of this year's new members.

The second amateur boxing tournament of the season organized by the **Telcon Amateur Boxing Club** was held in the canteen at Telcon Works, Greenwich, on 1st February. Mr. J. N. Dean, managing director of the Telegraph Construction & Maintenance Co., Ltd., presented the prizes.

Mr. H. Pickett, chief engineer of Unity Heating, Ltd., has completed twenty-five years' service with the company, and to mark the occasion he has been presented with a gold watch. In the absence of Mr. J. M. Young, managing director, his daughter recently made the presentation to Mr. Pickett.

Mr. Pickett receiving a presentation on completion of twenty-five years with Unity Heating, Ltd.

Mr. L. K. Merrill has been appointed a director of Bakelite, Ltd. **Mr. H. S. Bunn** has resigned from the board.

The annual dinner of the **Incorporated Plant Engineers** was held at the Café Royal, London, on 29th January, under the chairmanship of the president, Mr. J. C. Veale. In proposing the toast of "The Institution," Sir Hubert Houldsworth (chairman of the National Coal Board) said the Coal Board had extended its practical training scheme for mining engineers to cover mechanical, electrical and civil engineering, and it was taking steps for the establishment of area workshops to provide those facilities for the maintenance of plant which were so essential. He felt that some of the members of the Incorporated Plant Engineers had much to do to help this country in education in the use of fuel, and in providing means for assisting in its proper use.

Mr. Veale, in responding, said that the Institution had started off in civil engineering contractors' plant alone, but its activities had been extended, and it was now concerned with the maintenance and running of any engineering plant. The activities of its members could be grouped under four headings: management, fuel, productivity and service. Sir Henry Wilson Smith proposed the toast of the guests, and responses were made by Sir Charles Ellis and Sir John Cockcroft.

The fourth re-union dinner of former employees of **Edmundsons Electricity Corporation, Ltd.,** is to be held on 30th April at the Holborn Restaurant, when Mr. R. R. B. Brown, deputy chairman of the Southern Electricity Board, will preside. Tickets (16s 6d each) can be obtained from local representatives and from Mr. F. T. Scribens, B.E.A., Room 425, Winsley Street, London, W.1, or Mr. R. H. Sharman, B.E.A., Room 212, Bankside House, Sumner Street, London, S.E.1.

Miss Hazel Crompton inspecting equipment in Crompton Parkinson's historic collection at Chelmsford

Mr. R. C. Rettig, F.I.E.S., has joined the Commercial Engineering Department of Siemens Electric Lamps & Supplies, Ltd., as lighting engineer for Scotland. Mr. Rettig, who was formerly with the Lighting Service Bureau, will be at the company's Glasgow Branch.

Councillor J. D. Beard, managing director of Beard Electrical, Ltd., has accepted an invitation to be the next Mayor of Oldbury.

There was an attendance of about 90 at the second luncheon of the **Electrical Industries Club** held at the Connaught Rooms, London, W.C.2, on Tuesday last. Sir Norman Kipping, director-general of the Federation of British Industries, was to have been the principal guest and speaker, but he was prevented by illness from attending. The next luncheon of the Club will be held on 9th March.

The dramatics group of the **Johnson & Phillips Social Club** gave three performances of Emlyn Williams' play "Trespass" at Charlton last week.

OBITUARY

Mr. J. C. Arkless, F.C.I.S., director and secretary of A. Reyrolle & Co., Ltd., died on 1st February at a Newcastle-upon-Tyne nursing home, after a period of ill-health. Mr. Arkless, who was sixty-three years of age, joined the company in 1904, three years after its establishment at Hebburn. As the concern grew he successively became chief accountant, assistant secretary, and secretary, and was appointed a director in 1949. He was a director of the Parolle Electrical Plant Co., Ltd., the Bushing Co., Ltd.,

The late Mr. J. C. Arkless

J. H. Holmes & Co., Ltd., the Heaton Foundry Co., Ltd., and North East Wires, Ltd., and a member of the Local Committee of the Northern Assurance Co., Ltd. He was also a governor of the Electrical Industries Benevolent Association and past chairman of the Advisory Committee of the Northern Counties Area.

Mr. Arthur Henry Barker, B.Sc., B.A., M.I.C.E., M.I.Mech.E., M.I.H.V.E., M.A.Cons.E., whose death occurred on 27th January at the age of eighty-three, devoted the bulk of his professional life to heating and ventilation, and until his retirement shortly after his eightieth birthday, was a partner in A. H. Barker & Partners, consulting engineers, which he founded in 1911. He studied at Leeds University, the University of Wales and the University of London, and was awarded two Whitworth Scholarships. Later he became an assistant to the Professor of Engineering at Leeds University. After holding appointments with Hudswell Clarke & Co., Hunslet, Gwynne & Co., and Rose, Downs & Thompson, Hull, he was for ten years in charge of the Department of Heating and Ventilation of G. N. Haden & Sons, Trowbridge. He was the patentee of the panel system and a pioneer of low temperature radiant heating.

In his early professional days Mr. Barker was head of the Department of Heating and Ventilating Engineering at University College, London, and carried out much original research in the design, testing and rating of domestic cooking and heating apparatus. He contributed widely to technical journals, particularly on the relative merits of gas, electricity and solid fuel in the domestic sphere. Mr. Barker was a past-president of the Institution of Heating and Ventilating Engineers. The firm of A. H. Barker & Partners has continued in practice since Mr. Barker's retirement under the control of his partner, Mr. H. E. Baker.

Mr. Albert Campbell, who was for many years a member of the staff of the National Physical Laboratory, has died at Cambridge at the age of ninety-one. Mr. Campbell was educated at Derry Academy, Edinburgh University, Queen's College, Belfast, and Corpus Christi College, Cambridge, and for a time he was a schoolmaster. In 1893, however, at the instigation of the late Dr. Alexander Russell, he went to Faraday House, where in addition to teaching he carried out experimental work on electrical measurements, particularly with alternating currents. In 1901 he was one of a band, under Dr. (later Sir) Richard Glazebrook, who founded the National Physical Laboratory, and he built up the department of electrical measurements where he did most of the work for which he became known. His most important contribution was the design and installation of the primary standard of mutual inductance and the development of subsidiary apparatus and methods which made this the ultimate standard of reference for all alternating current measurements in his department. He retired in 1918, but continued his experimental work in his private laboratory. Mr. Campbell was awarded the Duddell Medal of the Physical Society in 1925.

Mr. N. H. Miller.—British Insulated Callender's Cables, Ltd., announces the death on 29th January, at the age of sixty-one, of Mr. N. H. Miller, A.M.I.E.E., assistant liaison officer of the company.

After serving as a pupil with the Hove Electric Light Co., Mr. Miller went to Siemens Bros. & Co., Ltd., and was later employed by the English Electric Co. at Stafford. He served in the Royal Engineers in the 1914-18 war and was mentioned in despatches. In 1920 he joined British Insulated Cables, Ltd., as assistant contracts engineer of the Telephone and Power Cables Department and from 1923 onward held the successive posts of contracts manager, London District, sales engineer, London Office, and manager, London sales office. In 1952 he was

The late Mr. N. H. Miller

appointed assistant liaison officer and held this position until his death.

Mr. Miller was a director of Panelec (Great Britain), Ltd., M.S.S. Recording Co., Ltd., Industrial Reels, Ltd., and Bartles (Carn Brea), Ltd.

Mr. Sydney George Butler, M.B.E., of Windy Ridge, Perton, who has died at the age of fifty-nine in a Wolverhampton nursing home, was formerly chief planning engineer with the English Electric Co., Ltd. At the time of his death he was joint managing director of Joshua Bigwood & Son, Ltd., Wolverhampton.

Mr. Robert Martin, electrical engineer and contractor, Lanark, Scotland, died while on holiday at Halifax last Friday. He was sixty-four.

Arts and Crafts Exhibition

A NATIONAL exhibition of arts and crafts by employees of the British Electricity Authority and the Area Electricity Boards will be opened on 19th February at the Royal Horticultural Society's Old Hall, Vincent Square, London, S.W.1, by Lord Citrine, chairman of the British Electricity Authority. It will be open to the public from 20th to 27th February. Admission is free. Prize-winning exhibits from sixty-one local Arts and Crafts Exhibitions which have been held within the electricity supply industry throughout the country, will be on show. They include oil paintings, water colours, photographs, models, needlework, dressmaking, leatherwork, woodwork, metal work and toys, and there is a special children's section. Mr. J. Worthington, a power station boiler operative who is also a member of the Royal Academy, is showing a painting. A concert, "Music as an Art," is being given on 27th February by the London employees' orchestra and choir and soloists from other parts of the country will take part.

I.E.E. BIRMINGHAM DINNER

Electricity and Smokeless Zones

ON Friday last week the annual dinner of the South Midland Centre of the Institution of Electrical Engineers was held at the Grand Hotel, Birmingham. There was a very good attendance and members of the Centre and their guests were welcomed at the reception preceding the dinner by Mr. H. J. Gibson, chairman of the Centre, and Mr. H. Bishop, President of the Institution.

After the loyal toast Mr. Gibson proposed "The City of Birmingham." He began speaking by expressing his sympathy with the Lord Mayor of Birmingham, who was unable to attend the function owing to a domestic bereavement. He welcomed Alderman A. Paddon Smith, J.P., who was present in the Lord Mayor's place. Mr. Gibson said Birmingham was the second largest city in the United Kingdom, while the electrical industry was the second largest exporter. One of the most promising enterprises of Birmingham was the 23,000 new homes provided since the war, all with electricity. Apart from these houses, the Midlands Electricity Board had also connected a further 23,000 homes during the same period. Mr. Gibson then turned to the question of planning green belts and smokeless zones. With the artist of the cartoon "The Coming Force," which appeared in *Punch* in 1882, he believed that electricity was the only fuel that would abolish grime.

Alderman Paddon Smith, who responded to the toast, said he hoped that Birmingham would have smokeless zones before very long. Birmingham was very close to the coalfields and the collieries were among the worst offenders in smoke emission. Industrial establishments, on the other hand, were mostly very good in this respect.

The toast of the Institution was proposed by Mr. F. J. Erroll, M.P., who said he was impressed by the world-wide nature of the Institution. His travels had confirmed the fact that it was an Institution for friendship as well as for the dissemination of engineering information. After referring to the international activities of the I.E.E. Mr. Erroll said how much he liked the new journal of the Institution of Mechanical Engineers "The Chartered Mechanical Engineer." He also praised the *Electrical Review* for "the way in which it had brightened itself up in the new year." He expressed the hope that the I.E.E. might do something similar to its sister Institution in this new era.

The response was made by Mr. H. Bishop, who pointed out that the Centre was the largest in the country and had a membership of 3,500, nearly 10 per cent of the total. In referring to Mr. Erroll he said that none was more vigilant than he with regard to electrical affairs. Electrical engineering was not sufficiently to the fore in public life and it was up to all I.E.E. members to put this right.

Turning to the question of education and training of electrical engineers Mr. Bishop thought this presented a very serious and pressing problem. There were many things that should be done but they would take a very long time. We must make sure that we got boys to enter the profession not only in the right quantity but more particularly of the right quality. In conclusion he said I.E.E. members should not give way to the dangerous tendency to drift away from each other in the four sections, but should do their best to remain as one corporate body.

The final toast of the evening, "Guests and Kindred Societies," was proposed by Mr. A. R. Blandford, senior vice-chairman, South Midland Centre, and the response was by the Bishop of Birmingham.

IN THE COURTS

AT Durham Assizes, the National Coal Board was ordered to pay £2,790 damages to Archibald H. Williams, aged sixty, of Castle Eden, an official of the North Eastern Electricity Board, who received burns while examining electrical equipment at Fishburn Colliery. Mr. Justice Donovan stated that on the day of the accident Williams went to Fishburn to investigate some defects in the Electricity Board's apparatus. Williams took action to have the electricity supply cut off but while cleaning connections on the apparatus he received extremely severe burns. The Judge said that Robert Hindmarsh, foreman electrician at the pit, had started the emergency generator without warning Williams. The Judge contended that Williams had taken all reasonable precautions and the Electricity Board had also fulfilled their statutory obligations and were not guilty of negligence. The National Coal Board, through their employee Hindmarsh, were guilty of breaches of two regulations under the 1911 Mines Act.

Damaged Cable

In the Court of Session, Edinburgh, recently judgment was given in favour of the North of Scotland Hydro-Electric Board in an action against David MacBrayne, Ltd. The Board claimed that its submarine cable between Kyle of Lochalsh and Skye had been fouled by the defendants' motor vessel *Lochmor* and that this was caused by negligent navigation. It was stated that at the end of December, 1951, the electricity supply to Skye was interrupted and when the cable was examined it was found to be extensively damaged. At the time there was a severe gale in the Outer Isle which the master of the *Lochmor* described as the worst in living memory, resulting in a great deal of damage.

Lord Hill Watson, giving judgment, said he had no hesitation in deciding that the damage to the cable was caused by its being fouled by the ship's cable. He was of the opinion that the master was guilty of negligence in allowing his vessel to be in the position in which it fouled the electric cable.

While it might be good seamanship to allow an anchor to drag in certain circumstances, in his view it was bad seamanship to allow the anchor to drag in proximity to an electric cable. He postponed a decision on the damages to which the Board was entitled. The amount claimed was £3,943.

Northern Line Extensions Abandoned

AS a part of the 1935–40 railway new works programme, London Transport intended before the war to extend the Northern Line beyond Edgware to Bushey Heath and also to electrify the line between Mill Hill East and Edgware. These works had to be deferred owing to the war and in 1950 were further postponed. London Transport has announced that as no further major housing development is intended in the area which would be served by the proposed extensions, and with the increased cost of railway construction and operation, the foreseeable traffic would be totally inadequate to justify the extensions. Accordingly, with the concurrence of the British Transport Commission it has been decided that the works in question should be abandoned.

VIEWS on the NEWS

By REFLECTOR

SOME time ago I mentioned a photograph I had seen in a newspaper of a house being built round a transmission line pole, which had to be subsequently removed. A somewhat similar affair is reported from Warwick where four "pylons" are in the way of a housing estate. They are 22ft high and the local Housing Committee wishes them to be raised by 12ft. The cost is said to be £4,000, whereas the alternatives of diversion of the line or placing it underground would involve expenditures of £10,000 and £50,000 respectively. The *Birmingham Mail*, which reports the matter, does not indicate by whom the cost is to be borne. Neither side knew when the line was erected that the land would one day be used for housing.

* * *

When the writer of last week's *Electrical Review* leader made passing reference to the effect upon export trade of the electricians' strikes I am sure that he did not have dogs in mind. The stoppage of work by the E.T.U. men at Olympia led to the cancellation of the annual Cruft's Dog Show, which in itself does not really seem to be a national calamity. Yet it is indicative of the far-reaching effects of such industrial disturbances that the chairman of the Kennel Club said that the cancellation of the show was "a disaster from the export point of view." Figures between £100,000 and £250,000 have been mentioned as the value of annual canine exports resulting from the show.

* * *

Not having so far been troubled much with frozen pipes I cannot confirm a claim made that electric hair dryers are highly efficacious for thawing purposes. Certainly they appear to have advantages over the somewhat brutal methods provided by blow lamps or kettles of boiling water and are not so messy as hot cloths. A warning should be given however of possible dangers resulting from having long trailing flexible extensions in proximity to water pipes, for undoubtedly the original flex will not be long enough to reach the affected situations.

* * *

"Woman Will Get Electric Shock Whenever She Bites" is a headline in the *Daily Sketch*. The story is of a woman who has lost one of two gold fillings and has been forced to accept an amalgam substitute. And that, according to the newspaper, is where electricity comes in:—

> "The two fillings will touch, and when the analgam meets the gold the woman will get a shock. The two metals, with acid in the saliva, will set up a simple kind of torch battery in her mouth."

I suspect that the only real sensation arising in this case is that created by the *Daily Sketch*.

* * *

Accommodation for workers on remote constructional sites is always a problem for contractors. The erection of hutments takes time and money, adding appreciably to the cost of the work. An alternative method now being employed by some contracting firms is to use caravans which can be moved easily from site to site and are generally more comfortable. Reference to the caravans used on three of the North of Scotland Hydro-Electric Board's schemes was recently made by William Hickey in the *Scottish Daily Express*. These must be fairly large vehicles, for it is said that each has two neatly-furnished rooms with three beds in each. There are carpets on the floor, coal stoves and gas lighting.

* * *

A member of the Windsor Rural District Council at a recent meeting described as "distasteful" the requirement of a guaranteed revenue by the Southern Electricity Board before it proceeded with an extension. He asked why the Postmaster General did not ask for guaranteed revenue for his telephones and the use of his postal services. I wonder if he has ever tried to obtain telephone service for premises well away from an existing route.

* * *

A series of demonstrations for men only has been organized at Nelson (Lancs) by the North Western Electricity Board. One of the demonstrators told a *Northern Daily Telegraph* reporter: "We are offering this opportunity to men to help them cope with domestic duties while their wives are ill or away." To me it looks like the thin edge of a rather dangerous wedge.

* * *

What is a "Power Chief"? I had thought the answer to be anybody in the electricity supply industry above the rank of switchboard attendant whose name got into the daily papers. But the distinction goes further than this: the *Star*, dealing with leaflets circulated by the National Federated Electrical Association, heads its report:—"Power Chiefs put 'Case'."

* * *

When electricity was really in its infancy it seems to have attracted many undesirable characters who saw in the new force an opportunity of making easy money. That was the reason for a diatribe by Mr. W. H. (later Sir William) Preece at a Society of Arts meeting seventy years ago. The *Electrical Review* of 9th February, 1884, reported him as saying:—

> "At present they were passing through a stage of electrical depression; robbery had been committed on a large scale; the earnings of the poor had been filched out of their pockets by sanguine company promoters; an enormous amount of money had been lost, and the result had been that confidence was, to a great extent, destroyed. But those who had been wise enough to keep their money in their pockets, and to read the papers read in that room, must have seen that there was a constant steady advance in scientific knowledge of the laws of electricity and in their practical applications, and as soon as some of these rotten mushroom companies had been wiped out of existence they might hope that real practical progress would be made, and that the day was not far distant when the public would again acquire confidence in electrical enterprise."

INDUSTRIAL NEWS

Supply Engineers' Salaries

YESTERDAY (Thursday) the British Electricity Authority was to consider the request of the Electrical Power Engineers' Association that there should be a direct meeting with the Authority to discuss the Association's claims for a substantial improvement in the status and salaries of electricity supply engineers and technologists. Should the request for an interview not be granted, then the Association decided to serve notice under clause 47 to terminate the National Joint Board Agreement.

As one basis for its claim for improved salaries for its members the Association contends that the technical staff in the electricity supply industry is undervalued and underrated in comparison with the administrative grades. Replying to this in the February *Public Service* (the journal of the National and Local Government Officers' Association) Mr. L. G. Moser says: ". . . we accept neither that the administrative staff make a lesser contribution to the well-being of the industry than their engineering colleagues, nor that their status or remuneration should suggest that they do."

The E.P.E.A. is the sole representative organization for the technical staff in the electricity supply industry. The grades of engineers included in the membership are sub-area managers and engineers, power station superintendents, distribution and transmission engineers, shift charge engineers, construction engineers, sales engineers, combustion engineers, control engineers and meter and testing engineers.

F.B.I. and the Budget

In making its customary representations to the Chancellor of the Exchequer in advance of the Budget statement, the Federation of British Industries again draws attention to the detrimental effect of high taxation upon saving and enterprise. It advocates the reduction of the standard rate of income tax which it says would have beneficial results both for individuals and companies. A further substantial reduction in the general rates of purchase tax is sought, with special consideration for classes of goods, particularly where exports are concerned, on which manufacturers can prove that the tax has a "killing" effect.

Death duties, as they affect private companies, should be examined to remove a serious injustice and the profits tax should be repealed on the grounds of equity as it is a discriminatory tax upon ordinary shareholders. The Federation calls for a fresh approach to the questions of depreciation of fixed assets and valuation of stock for tax purposes. Depreciation allowances should be granted for commercial buildings. Tax exemption of income and profits from foreign sources is advocated.

Another point put forward is the position as regards the repair or reconstruction of buildings and other necessary expenditure.

E.D.A. Luncheon

Mr. Geoffrey Lloyd, M.P., Minister of Fuel and Power, will be the principal guest at the E.D.A. annual luncheon, which will be held at Grosvenor House, Park Lane, London, W.1, on 14th April. The annual general meeting of the Association will take place in Grosvenor House after the luncheon.

Electrical Engineers' Exhibition

Sir Henry Self, deputy chairman (administration), British Electricity Authority, will officially open the Electrical Engineers' Exhibition at Earls Court at noon on 16th March, from the Association of Supervising Electrical Engineers' stand in the Grand Hall. A large scenic painting of one of Britain's latest power stations is to be erected across the wall of the Grand Hall and alongside the platform there will be seen a large B.T.H. circuit breaker 25ft high and floodlit both inside and out. For the first time there will be a stand by the Department of Atomic Energy with models of the layout of the new generation equipment, with photographs and drawings. A considerable number of exhibits of heavy and light switchgear include many new types. There are a considerable number of entries for the 1954 labour saving awards which will be again judged by the A.S.E.E. technical and E.A.W. Committees. The total number of exhibitors is now over 180, which is over 70 more than last year. The exhibition is now more than twice the size of last year.

Philips Bristol Branch

Philips Electrical, Ltd., informs us that, in spite of the damage caused by the recent fire at its Bristol Branch, the sales and supply organization is still functioning normally. Business is at present being carried on from 47/49, Victoria Street, Bristol, and the telephone number (Bristol 20307) remains unchanged.

Hospital Anæsthetic Explosion

An inquest was held at Shrewsbury on Friday last into the death of a patient at the Royal Salop Infirmary after an explosion which occurred during an operation. Giving expert evidence Mr. C. Powell (Ministry of Health) expressed the view that the explosion in anæsthetizing apparatus was caused by a discharge of static electricity, not by any fault in the equipment. The humidity of the operating theatre was estimated at 15 per cent, against a figure of 55–60 per cent recommended during operations.

Professor J. M. Webster (West Midlands Forensic Science Laboratory) spoke of his experience of similar incidents and said that one means of prevention was to wet the theatre floor after each operation. He thought that the dry, frosty weather was the cause of the electrostatic change.

An anæsthetist said that during the operation he decided to change the apparatus. Immediately he disconnected the equipment in use the explosion occurred. The patient was given artificial respiration with oxygen and recovered; the operation was continued but he died two hours later.

A verdict of "Accidental death" was returned.

Prices of Materials

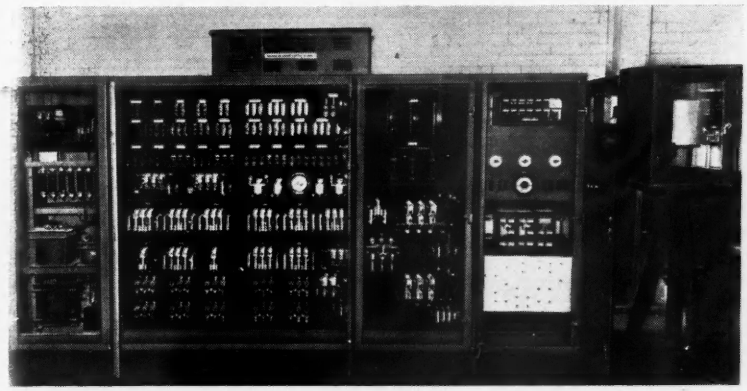
In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £229 10s 0d
Fire Refined 99·70%	ton £228 0s 0d
Fire Refined 99·50%	ton £227 0s 0d
COPPER Tubes ..	lb 2s 2½d
Sheet	ton £287 0s 0d
H.C. wire and strip	ton £255 10s 0d
LEAD, English ..	ton £83 0s 0d
Foreign	ton £82 0s 0d
MERCURY	flask £63 10s 0d
TIN, block (English) ..	ton £657 10s 0d
ZINC, G.O.B. Foreign	ton £72 0s 0d
Electrolytic	ton £73 15s 0d
BRASS Tubes (solid drawn)	lb 1s 9½d
Sheet	ton £233 0s 0d
Wire	lb 2s 4¾d
PHOSPHOR BRONZE Wire	lb 3s 7½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 16⅜d–16½d

Japanese Import Quotas

Brief reference was made in last week's *Electrical Review* to the Anglo-Japanese trade agreement under which, inter alia, quotas were fixed for imports from Japan of electric lamps and lighting fittings during 1954. The details are as follows:—

Lamps and lighting appliances (to a value of £25,000):—Hand lamps, pocket lamps, hand torches and inspection lamps operated by a dry battery, and cases therefore; lighting appliances and fittings, not containing glassware decorated by cutting (including intaglio cutting), engraving, etching or



Metro-Vick mine winder auxiliaries control board in the Orange Free State

gold enamelling; parts of the foregoing, excluding batteries and lamp bulbs. Lamp bulbs, filament, of a voltage of 12 or less, £15,000; lamp bulbs, filament or discharge including fluorescent, of a voltage greater than 12, £10,000.

Mines and Quarries Regulations

Certain cables and other electrical apparatus in use in metalliferous mines and in quarries before 1st July, 1938, have hitherto been exempted from the General Regulations made in 1938 for these mines and quarries. Amendments to the General Regulations have now been made under which such cables and apparatus must comply with the Regulations by 1st September, 1955. Copies of the amendments can be obtained from H.M. Stationery Office (2d each); they are the Metalliferous Mines (Amendment) General Regulations, 1954 (S.I. 1954 No. 84) and the Quarries (Electricity) (Amendment) General Regulations, 1954 (S.I. 1954 No. 86). Two previous Orders (1947) which exempted this apparatus are revoked.

Indian Protective Tariffs

Continuation of the protective tariffs by the Government of India upon the following items is notified, among others, in the *Board of Trade Journal* of 30th January:—Copper, wrought, and manufactures of copper; copper rods; aluminium plates, sheets, circles, etc., and ingots, bars, etc.; bare hard drawn or annealed electrolytic copper wires and cables, etc.; squirrel-cage induction motors not exceeding 20 b.h.p.; electrical accessories made of plastics; and brass electric lampholders.

A.C. Mine Winders

The development of dynamic braking has, during the last year or so, led to the increased use of a.c. induction motors for driving large mine hoists. A recent example is the 4,500 h.p. equipment which is installed at the No. 1 shaft of the Virginia Gold Mining Co., in the Orange Free State and is one of three similar winders supplied by the Metropolitan-Vickers Electrical Co., Ltd., to the Anglo-Transvaal Consolidated Investment Co., Ltd. This installation comprises a 14ft diameter double-drum winder driven through gears by two 2,250 h.p. (5,625 h.p. peak) 490 r.p.m. 6,600 V type AIF induction motors; it is equipped with the latest Metro-Vick transductor-controlled dynamic braking system.

An interesting layout is employed in this installation, all the auxiliary equipment for the control of the winder being assembled on a single "winder auxiliaries control board." This arrangement lends itself to a neater layout of the equipment in the winder house, and it also cuts down the external cable connections between various items of equipment. A Metro-Vick mine hoist recorder can be seen to the right of the control board.

Jackson Cookery Book

A new and revised edition of its cookery book (compiled by Ester Purvis) has been brought out by the Jackson Electric Stove Co., Ltd. This handsome production, which is provided with each Jackson cooker, has 166 pages containing notes on the care of the cooker, useful general information and about 700 recipes of all kinds. It is well illustrated and has a washable cover.

Canadian Material Handling Factory

Fisher & Ludlow, Ltd., Birmingham, has signed a contract with Sir Robert McAlpine & Sons, Ltd., London, for the erection of a factory at Ajax, Ontario. This factory is to cater for the growing demands of its material handling division. The building will enable Fisher & Ludlow (Canada), Ltd., to market the full range of "Fisholow" products. The building will be of modern design, the structure being entirely of steel, and the framework being completely independent of the outer walls. There will be a 14ft clear ceiling height, the whole being designed for maximum material handling efficiency. Apart from its primary function of providing manufacturing and storage space, this plant will be used as a demonstration centre for material handling and storage equipment.

Electricity in Grain Drying

The Scottish branch of the General Electric Co., Ltd., has arranged, in conjunction with the Area Electricity Boards in Scotland, the North of Scotland Hydro-Electric Board, and with the support of agricultural engineers, a series of public lectures entitled "Electricity in Grain Drying." These are being given at Dumfries, Perth, Aberdeen and Kirkcaldy by Mr. William Cover, A.M.I.E.E., M.I.B.A.E., of the G.E.C. Agricultural Department.

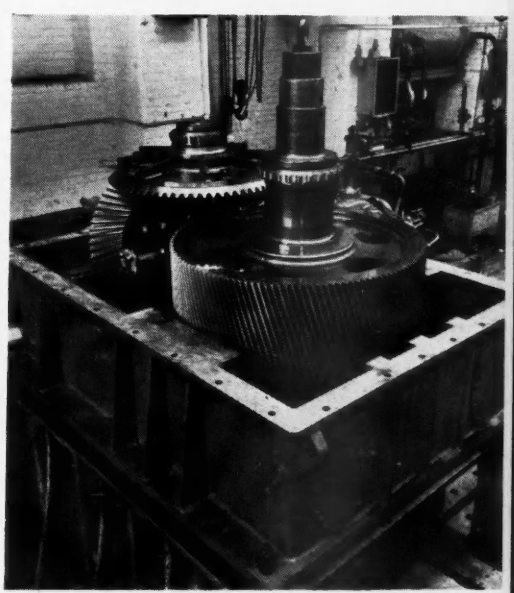
Aspects of the subject dealt with by Mr. Cover include grain moisture content, capital and running costs, types of electrical equipment available, platform and silo installations, seed and farm crop drying, and maintenance. In conclusion the advantages of electrical methods are itemized.

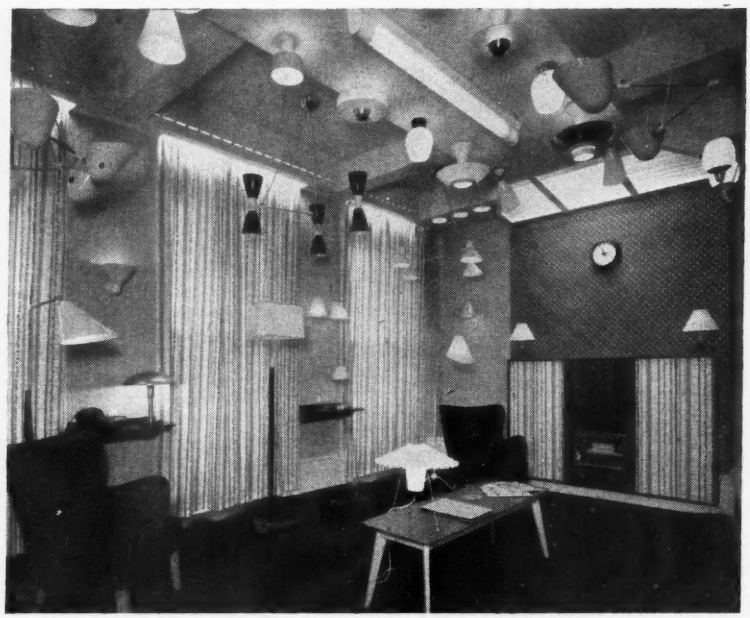
Water Turbine Plant

Among recent orders for water turbine plant completed by David Brown & Sons (Huddersfield), Ltd., was a combined helical and bevel increasing gear unit for the North of Scotland Hydro-Electric Board's scheme at Mullardoch Tunnel, Inverness-shire.

Designed to transmit 3,600 h.p. continuously at 208/755 r.p.m., the unit has a vertical input shaft and horizontal output shaft. The single helical gear which is located on a roller bearing (above) and heavy Michel thrust bearing (below) is of 32in centre and 32in face width, while the spiral bevel gears each have an 8in face with 27in cone distances. All gears are of

David Brown combined helical and bevel increasing gear unit





New lighting showrooms of Troughton & Young (Lighting), Ltd., at its Liverpool branch

alloy steel. The unit is enclosed in a fabricated case.

Trade with Russia

Reuter reported last week that the Soviet Minister of Foreign Trade (Mr. Kabanov) had announced that Russia was willing to place contracts valued at £400 million with Great Britain during 1955–57 and also to raise the annual amount of contracts placed to as much as £270 million a year for the three years. Mr. Kabanov was addressing the party of forty British industrialists, headed by Mr. J. B. Scott (Crompton Parkinson, Ltd.), who were visiting Moscow.

Specific contracts for trawlers and textile machinery were mentioned and Mr. Kabanov said that Russia was ready to place orders, among other items, for power equipment to the value of 600 million roubles (about £49 million).

Lighting Showrooms at Liverpool

Troughton & Young (Lighting), Ltd., opened a new lighting showroom at its premises, 46, Rodney Street, Liverpool, last week. Many architects and consulting engineers visited the showroom and were impressed with the transformation which had taken place in what was formerly an old fashioned room, and the wide selection of lighting fittings on view. The fireplace has been covered in and decoratively treated, with an electric radiator in the front panel. A false ceiling, with fluorescent cornice lighting, conceals the heavy plaster mouldings. The contemporary furnishings harmonize with the modern treatment of the showroom, which has been designed by Mr. D. Shellshear (Troughton & Young's senior designer) and a staff colleague. There are forty lighting points and about half-a-dozen plug points, controlled by twenty-eight switches on the one panel. The fittings include pendants, table lamps, stand lamps, wall lamps, louvred fittings and fluorescent fittings. It is considered that the showroom will provide a useful facility to architects and their clients in planning lighting installations. The opening was celebrated by a cocktail party held in the showroom. Mr. Arthur Young, director of the company, attended from the head office in London. The manager of the Liverpool branch is Mr. J. R. Parker.

Mechanical Handling Exhibition

The March issue of *Mechanical Handling* (published on 26th February at 2s 6d) will contain full advance details of the fourth Mechanical Handling Exhibition and Convention which that journal is organizing at Olympia from 9th to 19th June. Designed specially for overseas buyers, it will deal with the equipment to be displayed and will include a preliminary list of names and addresses, exhibition plans and facilities, and an advance Convention programme. It will also have, in the form of a loose inset, a list of driver-operated British industrial platform trucks with complete specifications.

Free admission tickets are available from the Exhibition Manager, Dorset House, Stamford Street, London, S.E.1.

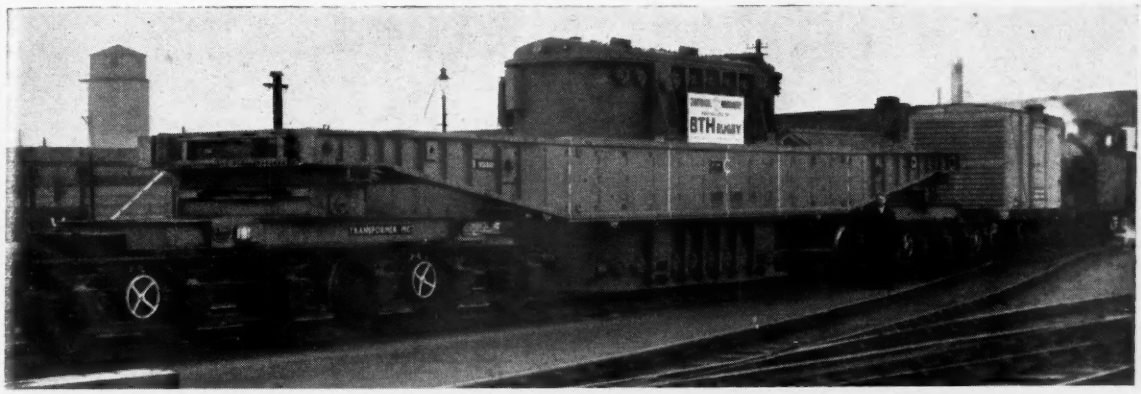
Window Display Competition

As in 1952, a window display competition was held at Christmas, 1953, for all the service centres of the Yorkshire Electricity Board. The service centres were divided into two classes—class "A" with a large amount of window space and class "B" with a smaller amount. Sub-Area managers were asked to choose one service centre in each class in their Sub-Area for entry into the area competition. These selected entries were judged by Mr. Mercer, the Board's advertising agent and Mr. A. Haselhurst, chief commercial officer.

In class "A" the service centre at Ferensway, Hull, was awarded the first prize and that at Sunbridge Road, Bradford, the second prize. Last year's winner, Huddersfield, received a certificate of special commendation. In class "B" the first prize was won by the Holmfirth service centre and the second prize by Otley. Pontefract received a certificate of special commendation.

The first prize in each class was a silver cup and the second prize winners received certificates of merit. The prizes and certificates were presented to the winners by the chairman of the Board, Mr. D. Bellamy, at two functions, one at Huddersfield and the other at Hull, when the Sub-Area managers, Mr. C. Booth of No. 2 (Huddersfield)

Mr. D. Bellamy, chairman of the Yorkshire Electricity Board, presenting a silver cup to Mr. W. Pollitt, local manager, Holmfirth. Other officials in the picture are (left to right) Messrs. A. Haselhurst (chief commercial officer), R. McVeagh (senior showroom assistant, Huddersfield), F. A. Pitchforth (Sub-Area display assistant), S.A. Mercer (advertising agent), H. Waite (Sub-Area senior assistant engineer), G. Sheppard (Sub-Area commercial officer), C. Booth (Sub-Area manager), and G. A. Farthing (section head (development), head office)



A B.T.H. transformer on one of the new British Railways transformer wagons

and Mr. C. Cameron Kirby of No. 6 (Hull), arranged lunches at which the winning competitors received their prizes from the chairman.

Belfast Power Plant Contract

Reference was made at the monthly meeting last week of the Belfast Corporation to the question of tenders for equipment for the new Victoria power station. Contracts placed by the Corporation some months ago were withdrawn after a decision by the High Court that the contracts should have been advertised. Alderman M'Kee, whose application for an injunction against the Corporation raised the matter, said at the meeting it was rumoured that the Northern Ireland Minister of Commerce was likely to step in. He was concerned lest the Corporation did not deal expeditiously with the tenders which were to be lodged with the Town Clerk by early March.

If the Minister contemplated the securing of powers for use only if the Corporation were not prompt in dealing with the tenders there could be no objection. But it had been suggested that he might ask for powers to prevent the Corporation from dealing with them at all.

According to the *Belfast News-Letter*, Ald. M'Kee went on to say that the specification for the boiler contract provided for the stokers to be of " Babcock & Wilcox " or other approved manufacture. Two firms had asked the consultants for approval of the types they proposed to submit. He moved that indication should be given as soon as possible whether the alternative stokers would be acceptable. This proposition was defeated without a division, a member describing it as " another of the many red herrings " introduced in connection with this matter.

New Transformer Wagon

British Railways have introduced a new transformer wagon which can carry 135 tons. The wagon shown in the accompanying picture began its first journey on the London Midland Region on 28th January, carrying a transformer weighing 119 tons from the British Thomson-Houston Co.'s works at Rugby to Staythorpe power station. It is one of two such vehicles built for British Railways and is accompanied by its own tool van. The wagon is constructed to give a clear loading space of 30ft in length and from 6ft 11in to 9ft in width between the side beams on which the load is supported, although loads much in excess of 9ft wide can be carried above the beams. The wagon weighs 72½ tons, is 92ft in length over buffers and has 24 wheels mounted on four bogies. When a load wider than the normal railway loading gauge is carried the side beams and load can be traversed to either side to clear obstructions such as bridges and signal posts. The wagon's side beams are removable to facilitate loading.

Awards for Proximity Fuze

A total of £15,000 has been awarded by the Royal Commission on Awards to Inventors to seven men in respect of the radio proximity fuze. Messrs. H. Cobden-Turner, G. M. Tomlin, W. H. B. Lord and L. Rollin are to receive £11,500 jointly. Other awards are made to Messrs. A. Stratton (£2,000), N. Coles (£750) and G. A. Whitfield (£750).

Electrical Manufacturing—1953

On page 205 of our issue of 29th January the rating of the thirteen 220 kV B.T.H. shunt-arc oil circuit breakers for Victoria was referred to as being 500 MVA. The figure should, of course, have been 5,000 MVA.

Trade Announcements

British Insulated Callender's Cables, Ltd., announces that it is continuing the manufacture of " Bicaloy " electrode tips. Although the manufacture of its resistance welding and heating machines was recently taken over by the Metropolitan-Vickers Electrical Co., Ltd., the arrangement does not affect " Bicaloy " welding tips.

R. S. McGibbon & Co., 46, West Princes Street, Glasgow, C.4, have been appointed as representatives in Scotland for the **Electric Depot, Ltd.**

Birfield Industries, Ltd., has acquired the whole of the shares of Kent Alloys, Ltd., Rochester, which company manufactures high grade light alloys and grey iron castings.

The **Mercantile Marketing Co., Ltd.,** 22, Grosvenor Crescent Mews, London, S.W.1, announces that it is now handling the sole distribution of the " Lowacost " light rings.

Catalogues and Lists

Clarke, Chapman & Co., Ltd., Victoria Works, Gateshead, 8, Co. Durham.—Illustrated brochure relating to floodlight equipment for football and sports grounds (115).

Crompton Parkinson, Ltd., Crompton House, Aldwych, London, W.C.2.—A technical leaflet for the information of ceiling fan users explaining the meaning and importance of " service value."

English Glass Co., Ltd., Empire Road, Leicester.—Leaflet on " Englass " moulded glassware products.

Measurement, Ltd., 7, Fitzalan Street, Kennington, S.E.11.—Illustrated technical brochure on the type O.S.L.81 oscillograph (1002).

Electroway Heaters, Ltd., Loughborough, Leicestershire. — Illustrated priced booklet covering the company's range of electric heating appliances (465).

G. & J. Weir, Ltd., Cathcart, Glasgow, S.4.—Illustrated brochure on marine refrigeration (160).

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Royal" *heat controlled* irons

Schofield cooker control panels

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

ARC FURNACES

Trend of Development in the United States

LAST week we published an account of a lecture given in Sheffield recently by Mr. J. C. Howard, director, Electric Furnace Co., Ltd., on his recent visits to Canada and the United States. The lecture was also given in Glasgow and the following report relates to the discussions which took place in both cities.

Mr. F. N. Lloyd asked if furnace linings had a longer life in the United States. Mr. Howard thought that if allowance was made for the varying conditions between the practices followed there was little significant difference.

Mr. F. T. Bagnall foresaw a big future for large arc furnaces for melting rimming steels and semi-killed steels, in place of the acid open-hearth furnace; he thought that the ease with which the arc furnace dealt with the high sulphur and phosphorus contents in British raw materials would tell in its favour. Mr. Howard agreed, but, in answer to other questions, said that when melting charges contained pig iron, the high slag bulk resulting from high silicon, manganese and phosphorus contents was a problem; this problem did not arise, however, with a high proportion of scrap in the charge: he thought there was room for a considerable increase in the present-day total consumption of scrap before the economics of the process would be upset.

Mr. A. G. Robiette doubted the possibility of using too high a proportion of liquid iron in the duplexing process, but suggested that the results with the plant at present being installed in Peru would throw light on this aspect, and the author agreed.

Mr. F. G. Connor mentioned the difficulty encountered in either charging or pouring when a large arc furnace was built on the platform in a conventional open-hearth furnace shop, while Mr. Eric Shaw thought the use of a tap hole would obviate the pouring difficulty. Mr. Howard said tilting furnaces were generally preferred, and that in cases where there were pouring difficulties these could be overcome either by using an extended articulated spout or by handling the ladles on bogies rather than by cranes.

Mr. Horton asked how the electric furnace was affected by continuous casting methods, and Mr. Howard thought a special furnace on the arc principle was best for the holding furnace, while for the continuous supply of molten steel arc furnaces were most certainly best; continuous casting would increase.

Electrode Comparisons

Mr. S. G. Meggitt asked if electrode consumption was lower in the U.S.A. as a result of faster melting, and if they had an effective economizer. The lecturer thought electrode consumption was about the same in the two countries; it was influenced by so many variables that it was difficult to give a fixed figure, but the main function of the so-called cooler was to form an effective gas-tight seal rather than to cool the electrode.

Mr. Mettam asked if the Americans used smaller electrodes than were used here, and Mr. Howard said that the electrode diameter depended mainly on the current carried, but that questions of mechanical strength when tilting had to be considered; this was another advantage of the design he had put forward where the electrodes did not tilt with the furnace; generally speaking, we had a tendency to use electrodes too large in diameter.

Mr. Fletcher asked what was done in the United States to deal with the large volume of fume that resulted from oxygen blowing, and the author said there were two problems involved: (1) to protect the operators, for which systems employing hoods, fans and ducting were used; and (2) to prevent pollution of the atmosphere, for which he had seen no plant installed; for this country he thought a water scrubber was a useful compromise where an electrostatic plant was too expensive to clean a gas collected in hoods or ducting.

In reply to another question Mr. Howard said that the capacities of the large furnaces described varied with the refractory thickness and the type of steel being made; under optimum conditions a 20ft diameter furnace would hold 100 tons and a 24ft diameter furnace 150 tons; power consumption according to the Battelle Report could be put at 590 kWh per long ton of ingots produced in a single slag process.

Mr. G. L. Tomlinson asked how the price of electricity affected the provision of future arc furnaces, and the reply was that in the United States the cost of electricity based on methods comparable to those in Great Britain was 0·9 cent (0·8d) per kWh; in purchasing power 0·9 cent was much less than 0·8d, and so there was room for improvement in this country.

High Frequency Equipment

In answer to other questioners Mr. Howard said that he thought this country was ahead of the United States in the use of high frequency furnaces, e.g., in the melting of scrap low in sulphur and phosphorus for which the Americans used an acid arc furnace with its higher costs: again in this country cast iron borings, which could not well be handled in any other type of furnace, were being melted in high frequency furnaces very economically, a fact which should interest car manufacturers who usually found the disposal of this material difficult; it was also possible to melt these borings in the normal frequency induction furnace which could also be used as a forehearth, in front of a cupola.

Replying to a representative of a transformer manufacturer, Mr. Howard gave the following data for some United States furnaces: (1) A melting rate of 24 tons/hour for a 6-electrode furnace rated at 15,000 kVA; this furnace had been working since 1937 and the chief criticism of the user was that it had a fixed roof and so charging was a lengthy process. (2) For comparison with the above a melting rate of 22 tons/hour for a 3-electrode furnace rated at 20,000 kVA; this relatively poorer performance was due to the impossibility of using the full power from only three electrodes for long periods without damaging the brickwork. (3) United States transformers were continuously rated. (4) Secondary tappings up to 500 V on 30,000 kVA were provided (at 60 c/s, as against our 50 c/s); high voltages had to be used very carefully, and no arc voltage higher than was essential to give good power factor should ever be used. (5) There was no need to use external reactors for any power over 6,000 kVA. (6) Rotary electrode regulators were preferred.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Electrical Equipment Sales

IN his speech at the Electrical Contractors' Association dinner on 27th January, the president (Mr. S. L. M. Barlow) is reported to have suggested the appointment of a Government Commission to explore the sale of electrical accessories to the public, as even a safe installation could be abused by subsequent extensions.

In this country rules and regulations abound for the safe supply and use of electricity. Yet it is an amazing fact that anybody, with no knowledge of electricity at all, or with that little knowledge which can be so dangerous, can go to the local chain store or the village cycle shop and buy electric wiring and accessories and connect them to his electrical installation with complete disregard of even the most elementary safety precautions.

According to "Fire Research, 1952," published on behalf of the Department of Scientific and Industrial Research and the Fire Offices Committee, no fewer than 12,575 fires occurring during the period 1947–52 were attributed to defective electric cables and wiring in buildings. Of all the fires during this five-year period, nearly half were in private residential houses or flats; so it is probably fair to assume that at least 6,000 of these "wire and cable" fires took place in private residences, and that of these the majority were attributable to the extension of and interference with permanent installations by persons either careless or ignorant of the risks they ran.

It is my opinion that urgent steps should be taken to restrict the sale of electric wire and accessories to those retailers who are able at least to advise their customers as to their correct use, and to discourage the dangerous activities of the handyman electrician. The appointment of a Government Committee would be a good beginning.

Thornton Heath, Surrey. L. C. ROBERTS, A.M.I.E.E.

Legislation and Metering Costs

AFTER reading Mr. Pugh's letter in your issue of 22nd January it would appear that he is hardly the right person to suggest that anyone is living in an economic "cloud cuckoo land." In his second paragraph he says in effect that there is no need to introduce legislation to reduce interest charges as the B.E.A. can fix the interest terms at 2 per cent if it so desires, but that it is doubtful if the required money would be raised if it did. What action should the B.E.A. take, Mr. Pugh?

My own view is that the cost of financing a non-profit making nationalized industry should be much less than 2 per cent per annum. A service charge only should be made on all capital issues to the B.E.A. and this should cover the cost of administration only. Some time ago the B.E.A. required £150 million and the price of the issue was £99 per cent, redeemable at par in 27 years, bearing interest at 3½ per cent. The actual amount which the B.E.A. received after taking account of commission and the fact that the loan was issued at £99 per cent was just over £148 million. If this loan is repaid at the end of 27 years the interest charges alone will exceed £139 million.

Fortunately, there is something to offset this amount which subscribers will receive. The B.E.A. will set a sum aside periodically, and it will be assumed that it is annually, which will be invested and with compound interest will amount to £150 million at the end of the loan period. This would require a total exceeding £94 million. The Authority will in the circumstances listed above, pay more than £139 million, plus £94 million, which equals £233 million for the loan of £148 million. Just think of it; £148 million to cover the cost of buildings, machinery and equipment required and also the wages and salaries of those engaged in any way on the new works and it will cost a further £85 million which will be paid for the use of this money.

After all these loans are merely book entries. A bank can lend up to nine times the amount of its deposits and does in fact lend several times the amount deposited without consulting any one of its depositors. It will be found that the total deposits in the banks are from four to five times the total amount of coin and banknotes in circulation, and it follows that it is the credits which have no backing in cash which the banks have granted which in turn have created further bank deposits.

I maintain that the Government could legislate to enable credits to be granted for purposes such as mining, electricity supply, gas, railways, water supply, sewage disposal, etc., at a nominal charge which would cover the cost of administration. As controls are exercised at the present time to prevent inflation, there is no reason for this aspect to present any real difficulty.

Although I do not claim extreme accuracy in the foregoing figures, they do at least bear some relation to the actual, and do show that financiers are taking more than their fair share from such as the electricity supply industry.

Welwyn Garden City, Herts. B. CROWSLEY.

Insulating Sheets

A FURTHER British Standard in the series dealing with synthetic-resin bonded paper materials for use as electrical insulation, B.S. 2076 : 1954, has just been made available (British Standards Institution, 2, Park Street, London, W.1, price 2s 6d). It specifies the requirements for two types of natural-coloured thermosetting synthetic-resin bonded paper sheets between $\frac{1}{64}$ and $\frac{1}{4}$ in thick inclusive, intended for use at radio frequencies up to and including 30 Mc/s. In this respect it is complementary to B.S. 1314 (1946), B.S. 1885 (1952) and B.S. 1951 (1953).

The electrical and physical properties specified include power factor and permittivity, insulation resistance, electric strength along laminæ, water absorption, shear strength, as well as those relating to machining and punching (for piercing and blanking). Methods of test to check compliance with the specification are fully described in appendices which include appropriate drawings.

Relaying Television Programmes

THE paper on the Manchester–Kirk o'Shotts television radio-relay system, which was presented before the Institution of Electrical Engineers on 4th February and summarized in the *Electrical Review* last week, was opened by Dr. A. R. A. Rendall (B.B.C.). The London–Birmingham 1in coaxial cable, he said, had simple terminal equipment but was expensive for a single television channel; the Birmingham–Manchester multi-tube coaxial cable required very complex modulation and demodulation apparatus and involved difficult design problems. The s.h.f. links, which had admirable transmission characteristics, were simple but a satisfactory cost for single-channel operation must depend on the integration of television connections with the communications network.

The Manchester–Kirk o'Shotts link had given extraordinarily reliable and stable operation. In 1953 the percentage of lost time in relation to the total time required for service was 0·052, which compared with 0·015 for the London–Birmingham link and nil for the link from Birmingham to Manchester. He wondered whether the very complex supervisory equipment on the Manchester–Kirk o'Shotts link could not be simplified. He believed that on some links in Germany a simple change-over apparatus was used at the repeater stations with a man nearby.

Manufacturers should decide on a standard intermediate frequency. With mobile links it was easy to inject into the permanent links if each had the same i.f., but every type of mobile link had a different intermediate frequency.

Frequency Limitations

Mr. H. Faulkner (T.E.M.A.) said that the system described was, he believed, the first commercial s.h.f. radio-relay system in Europe and the first in the world to use travelling-wave valves. He wondered, however, if it was not a little profligate in the use of frequencies. Could not multi-broad-band channels or even amplitude modulation be considered? There was much to be gained by integrating all requirements for trunk networks, including television, multi-channel telephony and cinema television. The production of travelling-wave valves with very low noise factors would, he hoped, lead to simplification and would eliminate intermediate frequencies. Regarding control, the transmission of a large number of broad-band channels on the same system would enable switching to be done at the ends, using a spare channel, instead of switching over the different spare equipments at the various stages.

Mr. A. W. Montgomery (S.T. & C.) suggested the need for some measure of standardization, taking the view that the basic schematic elements of the system might be dealt with by the C.C.I.R. and the C.C.I.F.

Dr. A. T. Starr (Cottage Labs., Ltd.) said that when thinking about this link some years ago they had had to make guesses about propagation, but there seemed to have been little difficulty with fading. They decided that heating of the paraboloids would be unnecessary. They also decided to use microwave valves, though told that their life was too short for telecommunication. A first experimental link rightly included a great deal of supervisory duplication, switching and so on.

Mr. H. Stanesby (G.P.O.) said that radio-relay systems would in future include broad-band channels for multi-channel telephony. The Post Office planned its cable networks on the basis of ten-year requirements, so that a cable for meeting an immediate requirement for a two-way television relay system might provide also two broad-band channels for telephony needed in five years' time and two more needed in ten years. A great deal of capital had to be invested in coaxial cable which would lie idle for a considerable time. With radio-relay systems it was necessary to provide only the equipment for those broad-band channels which were wanted immediately.

Standardization for radio-relay systems was important. As a result of the work done by the C.C.I.F. in 1938 all coaxial cable systems could be interconnected, and there was only one standard for the arrangement of the frequency spectrum. The time was overdue for considering similar standards for radio-relay systems.

At each intermediate station on the Kirk o'Shotts link the transmission equipment was completely duplicated and the reserve equipment could be switched in from a remote control station. As an alternative, a spare broad-band channel in each direction, switched at points perhaps 150 miles apart, would obviate the need to duplicate the reserve equipment if further broad-band channels were added.

Mr. Eckersley asked whether there was now enough information to say whether such a link would be suitable for the more onerous demands of multi-channel telephony.

Dr. T. G. Hammerton pointed out that the authors had given a complete yet concise system specification, but not the detailed reasons why the various parameters and their values had been chosen.

Mr. C. E. Clinch said that even the specified figure of 3,000 hours' valve life would add considerably to the running costs of the radio link, and the possibilities of longer life or lower cost would be of importance in operating economics. It was stated in the paper that the stand-by equipment was run at a low h.t. voltage, but they were now experimenting with running it at full power, thus obtaining greater stability of performance.

Mr. W. L. Wright said that the big difficulty with travelling-wave tubes had been the noise factor of the receiving tube, but it might be possible with three travelling-wave tubes—one low noise tube, one i.f. amplifier and one power amplifier—to have a repeater of equivalent performance to the i.f. repeater described by the authors.

Mr. D. B. Balchin mentioned some recent tests on four consecutive sections of the Kirk o'Shotts link which showed that the total duration of fading on the 47-mile path in 4,000 hours was several times as great as that over the other three sections. The two important differences between this longer link and the other three were that the length was greater and that the clearance over the predominant obstacle was considerably smaller. Perhaps the most important feature of map work was to know what clearance the main ray should have over the obstacle.

Mr. J. E. Bryden asked whether the authors were still convinced of the need of the standby policy adopted in the u.h.f. London–Birmingham link. In view of the large amount of supervisory equipment used an analysis of faults due to its use and faults due to the main transmission channel would be interesting.

Authors' Replies

Replying to the discussion, Mr. Dawson agreed that some simplification of the equipment, using either the t.w.a. repeater or a simpler type of i.f. repeater, was necessary. If a stand-by channel system was adopted, he said, the switching would probably be done at intermediate frequency, and i.f. switching might also be necessary for flexibility. Common aerial working, in view of the 85-db crosstalk requirement, would call for a great deal of discrimination between the transmitted and received frequencies, and it had not yet been possible to provide filters to achieve this.

Mr. Hall, dealing with the de-icing of aerials, said that aerodynamically it was almost impossible seriously to ice the middle of a paraboloid.

Mr. Merriman said that the supervisory equipment was basically simple and foolproof, did not contribute appreciably to the overall fault rate and did not overburden the system with cost, its cost being only one-tenth of that of the radio frequency equipment. On the question of frequency economy, to make a system simple it should be a wide-band system, but then it occupied more frequency space. For the systems of the future it would be necessary to design on the basis that there might be six or more broad-band channels simultaneously along one route.

Load Conditions in South West

IN A MESSAGE congratulating all power station employees in the B.E.A. South Western Division who had helped to achieve a record output during the severe weather, Mr. A. C. Thirtle, the controller, said that in the Bristol Grid Control Area the power stations had met a demand 19 per cent higher than the maximum last year and more than double the peak load during the great "freeze-up" of 1947. In many cases operating staffs had managed to secure a greater output than that for which the generating plant was designed. In fact, while the installed plant had increased by 11 per cent on last year the output achieved had been 12½ per cent higher. Within less than a fortnight engineers in the Grid Control Area had brought back into service repaired plant giving an output of over 140 MW. At one power station where a generating set failed the generator was stripped down, the faulty bearings were transported to a manufacturer for repair and, by round-the-clock working, the plant was in service again within four days. In addition to the heavy demands which had been met during the day, there had been a striking increase in the demand for power at night. Large numbers of people had been keeping radiators on to prevent water pipes from freezing, and within a fortnight the night load had risen by 27 per cent.

Travelling Service Centre

Faced with the problem of large areas of new housing estates in the Manchester locality having no available property to provide service centre facilities, the No. 1 Sub-Area of the North Western Electricity Board has equipped a travelling service centre of new design. This mobile centre has been produced mainly to serve the housing estate at Wythenshawe in South Manchester, one of the largest estates of its kind in the country, though two other districts in East Manchester, Denton and Droylsden, are included in its rota. The centre moves to a fixed position in a different part of these areas every morning and afternoon, and the Board has erected special pillars so that the vehicle can be supplied with electricity from the mains and can be connected to the Board's internal telephone system.

The vehicle is equipped for the taking of accounts and the sale of easy-payment account stamps, and for the display and demonstration of cookers, washing machines, water heaters and all the various miscellaneous types of small equipment. Water is carried in a 40 gallon tank slung under the rear of the chassis and can be pumped into a storage tank in the roof and heated electrically for laundry demonstrations. A special feature is the large window area, which allows the fullest display of equipment. Illumination is by four 4ft fluorescent fixtures and heating is by convectors.

The North Western Electricity Board's new travelling service centre

Irish Tariff Revisions

Because rateable value, which was formerly a reasonably equitable basis for the fixed charge, is no longer regarded as satisfactory, the Electricity Supply Board, Dublin, has decided to change over to the "number of rooms" basis for its domestic tariff. The Board's overall revenue from domestic consumers will not be materially altered, but consumers previously undercharged will pay more while costs to others will be reduced. In future, all consumers in the same area having an equal number of rooms in their houses will pay the same fixed charge.

Except in the case of consumers supplied from rural electrification networks, domestic two-part tariffs are to be replaced by the following tariffs. Domestic supplies other than on two-part tariffs (such as water heating or night storage heating) are not affected if they are separately metered. The new tariffs will apply to all accounting periods after 28th February.

Tariff I.—DUBLIN CITY.—Fixed charge (per two-month period): 8s for up to 5 chargeable rooms and 3s for each additional room up to 10. Running charge: 1·4d/kWh for the first 360 kWh in the two months and 1d/kWh thereafter. Consumers at present paying at the standard flat rates applicable to general domestic supply may continue to do so, but this option will not be available to new consumers or to existing consumers in respect of any other than their present dwellings.

Tariff II.—GREATER DUBLIN AREA, CORK CITY, LIMERICK CITY and WATERFORD CITY.—Fixed charge for two-month period: 8s for up to 4 chargeable rooms and 3s for each additional room up to 10. Running charge as for Dublin City.

Tariff III.—ALL OTHER AREAS.—Fixed charge: 9s for 4 rooms and 3s for each other room up to 10. Running charge: 1·5d/kWh up to 360 kWh and 1d/kWh thereafter.

Generally speaking "chargeable rooms" are bedrooms, living or reception rooms and kitchens. The Board reserves the right to alter the fixed amount for exceptionally large private residences having more than 10 chargeable rooms.

The following new scale of charges for consumers on current limiter supply is also being introduced, to come into force on 5th April:—Limited to 60 W, 1s a week; 100 W, 1s 6d a week; and 150 W, 1s 9d a week.

S.E. Scotland Industrial Tariffs

At last week's meeting of the South East Scotland Electricity Consultative Council new standard industrial tariffs which the Board proposes to introduce on 1st April were discussed. It was stated that Edinburgh industrialists would pay on average about 4 per cent more but there would be reductions in the Lothians and Southern Sub-Areas averaging 6 per cent. A number of objections were raised to the proposals which were referred to the district committees for consideration.

New Power Station Sites

At a recent meeting of the Holt (Wilts) Parish Council, Mr. V. R. Hockmeyer said he had heard a rumour that the electricity authorities were planning to erect a new generating station near Holt at a cost in the region of £7 million. He understood that a site had been selected and thought they should be told about it. The station would be almost the size of the whole village. Another member, Col. R. M. P. Beaven, said that Holt was only one of three sites in the West Country that were being considered and it remained to be seen which one was chosen.

It is understood that the British Electricity Authority is exploring the possibility of establishing a large generating station on the banks of the river Trent at High Marnham, near Retford. At present the inquiries are of an exploratory nature.

Cornwall's 100,000th Consumer

Recently Mr. H. Midgley, deputy chairman of the South Western Electricity Board, Mr. C. J. Hocking, Cornwall Sub-Area manager, and Mr. W. Hart, chairman of the Camborne–Redruth U.D.C., visited the bungalow home of Mr. and Mrs. S. J. Paull, the 100,000th family in the county to receive an electricity supply. Before the last war the number of consumers was about 40,000. Mr. Hocking said that the occasion spanned the whole history of electrical development in Cornwall, for the bungalow was within a very short distance of Cornwall's first power station at the old Electricity Works, Pool. The first Electricity Order authorizing a supply in Cornwall was granted in 1899 to Camborne.

Mr. Midgley presented Mrs. Paull with a vacuum cleaner to mark the occasion.

Wiring Plans

The first stage of the Newcastle-on-Tyne City Council's £115,900 scheme for installing electricity in old council houses has been completed at a cost of £10,263 compared with the estimate of £15,825. The whole scheme is being spread over five years. The City Council is to install electricity in 76 flats at St. Lawrence Square and 10 flats and houses in Walker Road.

Electrical wiring work costing £2,000 is to be carried out during the current year at the Peterborough Memorial Hospital and a further £1,500 is to be spent next year.

Stamford Town Council proposes to spend some £12,150 on wiring pre-war council houses.

Hull Education Finance and General Purposes Committee has approved proposals of the managers of the St. Vincent's R.C. School for the rewiring of the electrical installations at the school.

Gas-Electricity Choice

Tenants of new Council houses at Cockermouth are to be given the choice between an electric or a gas cooker.

Under an experiment proposed by the Darlaston Estates Committee housewives moving into the next 150 houses to be built on the Bentley estate will be asked to decide which they prefer, gas or electricity. The Midlands Electricity Board has informed the Council that no contribution will now be required towards the cost of servicing the estate.

Deferred Payment Terms

An alternative type of sales agreement for goods such as television sets, refrigerators and washing machines has been introduced by the Midlands Electricity Board. Under the new system the initial payment is reduced but the balance must be paid within nine months.

Power from Peat

The Scottish Peat Committee, of which Sir Edward Appleton is chairman, has recommended that the North of Scotland Hydro-Electric Board should receive financial assistance from the Development Fund to establish a peat burning power station at Altnabreac, incorporating a 2,000 kW closed cycle gas turbine. The total workable Scottish peat deposits are estimated at 600 million tons of solids.

OVERSEAS

Malta Electrification Scheme

The Government of Malta through the Crown Agents for the Colonies, on the recommendation of the consulting engineers, Messrs. Preece, Cardew & Rider, has placed an £80,000 order with J. G. Statter & Co., Ltd., for the manufacture and supply of 11 kV 250 MVA rupturing capacity metalclad switchgear to equip sixty-five substations required for the electrical development of the island. Although only a comparatively short time has elapsed since the order was placed, switchgear to equip eleven substations has already been dispatched. The contract is one of several similar ones for h.v. switchgear which the company has received during recent months.

Record Swedish Output

Sweden's output of electricity in 1953 was 22,500 million kWh. Reporting this, Mr. Ake Rusck, head of the Swedish State Power Board, says that the total was higher than for any previous year. About 9,500 million kWh, or 45 per cent, was generated by the Power Board, the remainder being produced by private or municipal concerns. The most important addition to capacity during the year was the Kilforsen plant in North Sweden.

Supergrid Route Inquiry

A PUBLIC INQUIRY was held at Cheltenham on 27th and 28th January into the proposal of the British Electricity Authority to erect a 275 kV line over the Cotswolds, via Alderton, Winchcombe, Andoversford and Cirencester to Melksham. The Gloucestershire County Council submitted an alternative route along the Severn Valley through Tewkesbury and Apperley, crossing the Severn south of Gloucester and proceeding by way of Frampton-on-Severn to Melksham. For the B.E.A., Mr. Gerald Thesiger, Q.C., said that the alternative route would be longer and more costly; moreover, there would still be objections from the amenity point of view.

The inquiry was conducted by Mr. H. W. Grimmitt, chief engineering inspector, Ministry of Fuel and Power, and Mr. H. R. Wardhill, a senior planning inspector of the Ministry of Housing and Local Government. The Worcestershire County Council and the Evesham and Pershore R.D.C.s wrote stating that they did not wish to press their objections at the inquiry but still desired to express their opposition on amenity grounds.

Mr. Thesiger said that the proposed route started at Hams Hall, east of Birmingham, and ran for 53 miles down the B.E.A. Midlands Division to the vicinity of Cheltenham and then for 37 miles in the Southern Division. There would be about 430 towers approximately 1,200ft apart and each 136ft 6in high. The width at the base would be 26ft so that cultivation could continue underneath. The arms at the top would be 40ft wide. Broadly speaking, the cost per mile when the towers were completely strung, which was not intended at first, would be about £30,000. The programme required that the line should be ready by 1956. Mr. Thesiger discounted any possibility of using underground cables, pointing out that even if that were technically feasible the cost would be something like half a million pounds a mile.

The Gloucestershire County Council's alternative route was supported by a number of local authorities and other organizations but was strongly objected to by private residents, on whose behalf Miss O. Lloyd Baker said that the line would "entirely shatter" the beauty of the vale. Mr. A. J. Drake (Ramblers' Association and Youth Hostels Association) thought the valley route would be less damaging, pointing out that for eight miles the B.E.A. route would be right on top of, or within a mile of, the "Cotswold Way," the ramblers' pathway planned along the ridge of the Cotswolds. Mr. P. W. Watkin (National Parks Commission) questioned the necessity for the line at all. The National Farmers' Union, though not objecting in principle to the proposals, asked that special attention should be paid to safety, taking the shortest route, and tower siting.

Winding up for the Gloucestershire County Council, Mr. D. G. Rogers said the Council did not suggest that its plan was the happy solution to all the difficulties, but the fact remained that 13 miles of hill country of especial scenic value was involved in the B.E.A. route but only ¾ mile in the Council's scheme.

Transformer Winding Resistances

Method of Measurement in Service

THE discussion on the Institution of Electrical Engineers Measurements Section paper entitled " Measurement of the Winding Resistances of a 132 kV Power Transformer in Service," by Dr. K. J. R. Wilkinson and Mr. J. D. Harmer, which was summarized last week in the *Electrical Review*, was opened by Mr. G. B. Harper (B.E.A.). He said that this was the first occasion in this country on which the winding resistance of a 132 kV transformer had been measured in service, using a method of superimposed direct current. Similar measurements had been made elsewhere, notably in France, but the published information, while laying down the basic principles, left a number of points unanswered. A difficult feature of such tests was compliance with safety regulations. Ironbridge was a particularly suitable site, as the control of the load permitted readings being taken and there were also facilities for putting in the extra equipment needed. Also the transformer was suitable for the inclusion of shunts in the neutral end of the phase winding. However, the authors had proved that one shunt in the neutral served the purpose just as well. Readings at four-minute periods were difficult to take, especially on a large transformer, as there was not time to make corrections and get adequate readings. The authors' method would greatly assist a more accurate appreciation of thermal problems.

Mr. L. Smith (British Electric Transformer Co.) said he regarded winding temperature indicators of the phantom type as very desirable devices. They were contrived by transformer designers to give the user information which would enable him to make greater use of apparatus under variable conditions of loading. They were, however, indicators rather than measuring instruments. One must therefore be prepared to accept discrepancies as regards the real hottest-spot temperatures which the authors had not measured.

E.R.A. Investigations

Mr. M. Waters (E.R.A.) said that E.R.A. had had to adopt the same technique as the authors in investigating thermal conditions inside small 100 kV transformers. Their problem was to measure the temperature rise of each coil of the high voltage winding, and thermocouples gave inconsistent results. If the authors could have used a three-limbed core, instead of a five-limbed transformer, they could presumably have injected considerably more current without harm. The real " nigger in the woodpile " seemed to be variations from the power supply which must be superimposed on very low frequency, presumably due to the d.c. lines and the switching of various parts of the system. Measurements across the lines might have provided less variation. Measurement of temperature by a rise of resistance might eventually prove simpler than other methods.

Mr. K. W. McBain (B.T.H.) looked forward to further work involving analysis of temperature distribution under complex transient heating and cooling conditions where present methods were not suitable for observing thermal characteristics. The authors' method offered designers yet another tool for probing the most complex and least understood part of the art.

Mr. E. T. Norris (Ferranti) said that the main problem now concerned mean oil temperature rather than winding temperature. The authors had shown that their method was a possible academic method, but the extent to which it would be put into practice remained to be seen. Knowing from experience how reluctant users were to spend £10 or £20 on a winding temperature indicator, which in spite of its faults was of some use, he could not imagine their spending £200 to £300 to achieve the same end.

Overload Conditions

Mr. F. H. E. Myers considered the temperature allowance very conservative. A considerable increase in output could be obtained at less capital cost if temperature-measuring devices were used.

Mr. D. P. Sayers (B.E.A.) also considered the design of British transformers to be on an extremely conservative basis. The B.E.A. now recognized that where the maximum demand occurred in the low ambient temperatures of winter an appreciable overload could be placed on a grid transformer for a short period without seriously shortening its life. This had meant a considerable saving in money. Design of plant must be matched to operating conditions.

Mr. A. J. Gibbons (B.E.A.) emphasized that the supply engineer wanted information about temperatures inside transformer windings for two reasons: first, to establish that a transformer was capable of continuously carrying a specified MVA without the temperature exceeding a certain figure; and, secondly, to work up from there to a safe figure. They were dependent largely on works measurement and the winding temperature indicator.

Mr. E. C. Rippon said the paper confirmed that the setting of a particular hot-spot indicator was correct and that some American figures were not inaccurate on a particular type of winding. If the authors' method were to be used as a guide the hottest spot in the copper, or the hottest piece of insulation and the average temperature of the oil must be known.

Mr. D. McDonald believed the hottest-spot temperature could not be measured but the authors' method enabled it to be derived more readily. It should be of help to designers in deciding the difference between the average winding temperature and the hot-spot temperature.

Mr. F. J. Lane (B.E.A.) said that simplicity was of the utmost importance and asked whether Dr. Wilkinson saw any possibility, when the method was developed further, of simplifying the method of approach.

Mr. A. J. Haselfoot was inclined to think that two problems had been confused in the paper and the discussion: the determination of the mean winding temperature and the determination of the hottest spot in the transformer on the basis of temperature measurements.

E.I.B.A. North Staffs Branch

A BUFFET dance is being held by the North Staffordshire Branch of the Electrical Industries Benevolent Association on Friday, 12th March, at the Grand Hotel, Hanley, Stoke-on-Trent. Tickets (one guinea each including buffet) are obtainable from the hon. branch secretary, Mr. C. T. Whittaker, c/o the Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent, or from any member of the social committee.

Financial Section

STOCKS and SHARES

STRONG and active markets continue to enliven the Stock Exchange. According to the recognized indices, industrial share prices have come within inches of the highest points ever previously recorded: the latter were notched early in 1947. At that time, the cheap money policy was still being pressed, and the reinvestment activities of dispossessed stockholders in the nationalized industries were near their height. This time, the main impetus is the anticipation of a thoroughly good season of company results, and some relaxation of the very tight dividend policies pursued during the years of inflation. Further grist has been added lately to the mill in the shape of the Chancellor's confident review of economic affairs; of a rise in Wall Street prices to the best levels seen since the war; and, on top of this, a reduction in the American bank rate, which brightened the gilt-edged market with ideas of corresponding action at home.

Lively Markets

Electrical equipment shares have again taken a prominent part in the aggressive advances of prices. British Insulated Callender's Cables are outstanding with a rise of half-a-crown to 42s 6d, on the strength of the company's $3 million contract with the British Columbia Electric Co. Improvements of the same amount were shown by Westinghouse Brake, Tube Investments and British Thermostat. Among the many shares marked up by 1s or more were Automatic Telephone, English Electric, G.E.C., Chloride Electrical, C. A. Parsons and Telegraph Construction. Reyrolles scored yet another big rise, this time of 3s 9d. Crompton Parkinson were quoted at 15s, with shares changing hands up to 9d higher than that. Brush were a better market at 5s, and among others on the up-grade were Allen West, Laurence Scott, S. Smith & Sons, and Dubilier Condenser. I.C.I. rose to a new record price of 56s 3d.

English Electric and A.E.I.

Austerity is the term which can be applied strictly to the dividend policies of both English Electric and A.E.I. in the post-war years. The former's ordinary dividend of 15 per cent in the last year involved the distribution of £418,000 net from the surplus of £1,475,000 remaining after a total charge of practically £3 million for taxation (including £505,000 for excess profits levy). In the case of A.E.I., the figures were under a million net for the ordinary dividend, from a surplus of nearly £4 million, after taxation of over £7 million (including a million for excess profits levy). Both companies declared a capital bonus during the year for which the accounts are now awaited. After making the

Week's Price Changes

Company or Board	Nom. Value	Middle price 8th Feb.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1953 Highest	1953 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	90½		3	3	3 6 3	90	83 11/16
Brit. Elec. 1974/77	100	89		3	3	3 7 5	89	82
Brit. Elec. 1976/79	100	95		3½	3½	3 13 8	94¾	88⅝
Brit. Elec. 1974/79	100	105		4¼	4¼	4 1 0	104	99⅛
Overseas Electric Supply								
Calcutta Elec.	£1	19/-		6†	6†	6 6 4†	21/-	18/-
East African Power	£1	21/6		7	7	6 10 3	25/-	20/9
Nigerian Elec.	£1	24/6		10	10	8 3 4	25/-	21/6
Palestine Elec. "A"	£1	17/6		Nil	Nil	Nil	19/3	7/7
Perak Hydro-Elec.	£1	15/3		Nil	6	7 17 3	17/10	13/6
Equipment and Manufacturing								
Aberdare Cables	5/-	8/6		20	25	7 7 0*	8/9	7/4
Aerialite	1/-	11/9		88⅓	88⅓	7 10 3	11/6	8/1
Allen, W .H.	£1	51/3	+1/3	15	15	5 17 0	51/-	42/10
Aron Elec. Ord.	£1	43/9		15	20	9 2 9	47/6	36/3
Assoc. Elec. Ord.	£1	45/6		20	20	4 8 0*	45/7	36/4
Automatic Tel & El.	£1	67/6	+1/3	15	15	4 9 3	65/3	55/-
Babcock & Wilcox	£1	48/9	+1/-	18	18	—	50/-	40/4
Baldwin, H. J.	2/-	5/3		20	20	7 12 6	4/1	3/-
Bakelite	10/-	26/3	+9d	—	12½	4 5 5	24/9	16/-
British Aluminium	£1	36/6		12	12	6 11 6	43/10	35/-
B.I. Callender's	£1	42/6	+2/6	9	10	4 14 3	40/10	33/3
B.I. Callender's 6% Pref. ...	£1	25/6		6	6	4 14 10	26/3	23/-
British Thermostat	5/-	21/3	+2/6	30	35	—	19/-	14/-
British Vac. Cleaner	5/-	13/9		25	25	9 1 9	16/6	11/-
Brook Motors	10/-	31/6		20	20*	6 7 0	37/-	27/10
Brush Ord.	5/-	5/-	+9d	10	4	—	5/4	2/11
Bulgin, A. F.	1/-	3/3		30	30	9 4 6	3/5	2/6
Burco	5/-	12/9		35	35	6 17 3*	12/2	8/6
Chloride El. Storage	£1	48/9	+1/3	15	20	4 2 0*	44/10	32/3
Clarke Chapman	£1	72/6		15	17½	4 16 6	70/6	57/6
Cole, E. K.	5/-	24/-		25	25*	5 4 3	23/9	14/2
Cossor, A. C.	5/-	8/6	+6d	10	10	5 17 9	11/4	6/4
Crabtree	10/-	27/-		17½	17½	6 9 8	32/6	23/9
Crompton Parkinson Ord. ...	5/-	15/-	+3d	11½	20	6 13 4	16/-	8/7
De La Rue	5/-	13/-		35	Nil	Nil	14/6	6/3
Decca	5/-	38/3	−3d	150	35*	4 11 6	37/9	17/6
Desoutter	5/-	16/9		16	18	5 7 6	17/6	14/3
Dewhurst	2/-	6/-		19	19	6 6 8	6/9	5/-
Dictograph Tel.	2/-	5/4½		20	20*	7 9 0	5/10	3/10
Dubilier Condenser	1/-	4/9	+4½d	28	25*	5 5 3	4/4	2/10
E.M.I.	10/-	14/-	+1/3	12	8	5 14 3	15/3	11/6
Electrical Components	5/-	12/-		20	20	8 6 8	12/-	9/3
Elec. Construction	£1	55/-	+1/3	15	15	5 9 0	56/-	50/6
Enfield Cable Ord.	£1	20/-	−6d	7½	5	5 0 0	24/10	17/-
English Electric	£1	42/6	+1/3	15	15	—	40/8	34/-
English Electric 3½% Pref. ...	£1	16/-		3½	3½	4 13 9	16/4	14/6
Ericsson Tel.	5/-	48/9		22†	22†*	2 5 2†	48/9	36/-
Ever Ready	5/-	26/6		35	35	6 12 1	29/-	25/-
Falk Stadelmann	£1	38/3		15	15	7 16 10	44/3	38/3
G.E.C. Ord.	£1	41/3	+1/3	22½	11¼*	5 9 0	46/-	36/3
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/7	24/9
General Cables	5/-	16/9		30	30	8 19 2	17/-	14/9
Greenwood & Batley	£1	42/-		15	17½	8 6 9	41/6	38/-
Hackbridge Cable	5/-	11/9		20	20	8 10 3	13/-	10/4
Hackbridge & Hewittic	5/-	17/-		20	20	5 17 8	18/3	16/1
Hall Tel. Acc.	10/-	11/6		10	10	8 14 0	12/7	8/6
Heatrae	2/-	4/-		12½	12½	6 5 0	4/3	3/3
Henley's	10/-	16/9	+3d	20	10½*	6 5 6	19/4	16/-
Holophane	5/-	13/9		20	20	7 5 6	13/9	11/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

appropriate adjustments of the previous rates of dividend, A.E.I. shares stand on a yield basis of under 4½ per cent, while English Electrics are quoted to show a return of barely 4¾ per cent. Whether or not some upward revision in these returns is to be called for should be known by the month end.

Doubled Price

Although the stock is very rarely dealt in, a minor stir was caused last week by the doubling of the dividend on Electrical & Industrial Investment deferred, and by the doubling also of the price of the stock concerned, which became quoted nominally at £600 per £100 unit. The event concerns mainly the controlling company, British Electric Traction. Another of that company's subsidiaries—the Birmingham & District Investment Trust—announced on the same day the maintenance of its dividend at 20 per cent out of increased earnings: a little previously this Trust had distributed a substantial bonus in the form of preference shares. These events kept in motion the steadily upward course of B.E.T. 5s deferred shares, which, now 44s, stand at the best quotation recorded in their present form.

in Electrical Investments

Company or Board	Nom. Value	Middle price 8th Feb.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1953 Highest	1953 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	27/9	+1/-	35	25	4 10 0	26/10	20/3
I.C.I.	£1	56/3	+1/6	13	13	4 12 6	54/-	41/6
Intl. Combustion	5/-	15/-	+3d	25	15*	5 0 0	15/6	12/1
Johnson & Phillips	£1	50/6		15	15	5 18 3	59/3	49/-
Lancashire Dynamo	£1	45/-		12½	12½	5 11 0	47/-	41/-
Laurence, Scott	5/-	15/3	+1/-	15	15	4 18 3	14/6	11/9
Lister, R. A.	£1	32/-		9	9	5 12 6	34/3	27/9
London Elec. Wire	£1	41/3	+1/3	12½	15	3 13 0*	38/3	26/-
J. Lucas	£1	53/6		9⅛	10⅝	4 1 6	51/3	35/6
Marryat & Scott	2/-	5/3		22½	22½	8 11 6	6/3	5/1
Mather & Platt	£1	54/-		12½	15	5 11 0	53/10	41/3
Metal Industries	£1	40/-		15	12*	6 0 0	47/9	37/9
Midland Elec. Mfg.	£1	63/9		15	15	4 14 0	63/9	56/3
Morphy Richards	4/-	19/-		40	40	8 8 6	16/3	13/-
Murex	£1	53/-		15	15	5 13 2	60/9	50/6
Newman Ind.	2/-	2/4½		10	10	8 8 6	2/10	2/-
Oldham & Son	1/-	2/9		35	17½*	6 7 3	2/10	2/2
Parnall (Yate)	5/-	4/9	−3d	6	6	6 6 3	4/9	2/6
Parsons, C. A.	£1	43/3	+1/3	10*	12½	—	48/-	27/9
Plessey	5/-	43/6	+3/-	25	30	3 9 0	37/-	20/1
Pye Deferred	5/-	19/9	+1/3	18	20	—	16/3	10/6
Revo	10/-	17/9	+6d	27½	27½	—	17/6	13/11
Reyrolle	£1	72/6	+3/9	10*	12½	—	79/-	51/-
Rheostatic	4/-	11/3		16½	19	6 15 0	12/-	8/-
Richardsons Westgarth	5/-	10/-	+9d	12	15	7 10 0	11/1	8/6
Scottish Cable	4/-	13/6		32	20*	5 18 6	13/3	11/1
Siemens Ord.	£1	37/-	+1/-	10	10	5 8 7	37/-	31/6
S. Smith (England)	4/-	13/6	+6d	12½	15	4 9 0	12/6	7/11
Southern Areas	£1	18/-		5	6	6 13 4	19/7	10/3
Strand Elec.	5/-	8/9		17½	17½	10 0 0	10/-	7/9
Sturtevant	5/-	32/6		17½†	18·1†*	—	29/9	20/10
Sun Elec.	£1	25/-		15	15	12 0 0	27/-	24/6
Switchgear & Cowans	5/-	12/6		22½	22½	9 0 0	16/9	12/6
Taylor, T.	5/-	12/3		20	25	5 2 0*	12/3	9/6
T.C.C.	10/-	43/9	+1/3	20	20*	—	42/6	31/5
T.C. & M.	£1	34/-	+1/-	10	8½*	5 0 0	31/6	25/6
Telephone Mfg.	5/-	7/6		10	10	6 13 3	9/4	7/1
Thorn Elec.	5/-	16/6	+6d	12½	12½	3 15 9	14/-	7/10
Thornycroft	£1	36/3	−6d	15	15	8 5 6	54/-	29/9
Tube Investments	£1	67/6	+2/6	15*	15	4 9 0	71/9	54/-
Vactric	5/-	8/9	−1/3	Nil	Nil	Nil	10/3	3/6
Veritys	5/-	7/-	+1/9	7⅛	10	7 2 9	5/4	4/1
Wallsall Conduits	4/-	46/3		70	70*	6 4 6	47/6	43/9
Ward & Goldstone	5/-	43/9		45	45*	5 2 9	46/-	29/9
Watford	2/-	5/-	+1½d	25	25	—	5/6	4/10
Westinghouse Brake	£1	68/9	+2/6	14	15	4 7 3	64/-	51/3
West, Allen	5/-	14/-	+6d	15	15	5 7 3	14/4	10/3
Wolf Electric	5/-	13/-		—	15	5 15 6	12/8	9/6
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	83½		—	6	7 3 9	91	77
Ord.	100	52½		—	3⅜	7 2 10	57½	53
Anglo-Portuguese	£1	22/9		8	8	7 0 8	23/9	20/1
Brit. Elec. Traction:								
Def. Ord.	5/-	44/-	+2/6	25	35	3 19 6	39/6	21/3
Cable & Wireless:								
Ord.	100	170	+3	8	9	5 6 0	148	124
4% Loan	100	97½		4	4	4 2 1	97½	93
Calcutta Trams	£1	19/-		6†	2½†	—	23/6	16/-
Cape Elec. Trams	£1	14/-	+1/-	5½	5½	7 17 3	13/-	9/-
Marconi Marine	£1	28/9	—	10	10	6 19 2	31/6	26/9
Oriental Tel. Ord.	£1	80/-	+1/3	16	16	—	75/-	59/-
Telephone Props.	£1	4⅜		8	8	—	126/3	33/-
Telephone Rentals	5/-	9/6		10	10*	—	10/-	6/8

Burgess Products

An interesting movement among the usually less active electrical shares is the rise in the price of Burgess Products 5s ordinary since the capital bonus proposal announced by the company at the end of last month. Quoted at under 20s at the beginning of the year, the shares have changed hands lately up to 29s. The intention, subject to official consent, is to issue one bonus share for each share held. The announcement drew attention to the company's progressive earnings and dividend record of recent years and to the distinctly conservative character of the 30 per cent payment for the year ended last July. It was noted additionally that the net amount of that distribution was substantially smaller than the sum charged in the accounts against excess profits levy. Present capital totals £200,000, divided equally between ordinary and preference shares. On the basis of the last dividend, the yield on the former at 29s works out at a little under 5¼ per cent.

Other Features

E.M.I. shares, with a rise of 1s 3d, came into favour in the radio group, where Plessey were still the star performers, adding 3s to the previous advances. Cossor, Pye and Ultra all went better. There was an outbreak of activity in Verity's, which were dealt in at 7s and over, on rumours of a "bid" for the shares. The price was marked back after a statement that the company was engaged in no negotiations of any kind. Cable & Wireless stock added 3 to the 19 points rise which followed the dividend declaration in the previous week.

Decca Results

The final dividend and profits figures announced last week by Decca Record were received with satisfaction in the market. The price of the shares was maintained at around 38s 3d, which is considerably more than double that at which the shares could have been

bought at one time last year. Trading profits for the year to last March, expanded by a little under 10 per cent, and the dividend on the ordinary is being raised from a total of 1s 6d to 1s 9d per share. In addition, it is proposed to split each 5s share into one 4s and one 1s preference shares, the latter to be consolidated into 5s shares and to carry a 25 per cent dividend. This operation is to be followed by a "rights" issue of ordinary shares. Finally, an interim dividend of 3d per share (as before) is to be paid for the current year and will apply to the increased capital. It will be difficult to establish a yield basis for the shares until these proposals are put into effect. As matters stand, the return can be calculated as 4½ per cent, but this should work out at about a point higher after the changes.

This Month's Events

Two major events in the field of electrical investments are due this month in the shape of the final dividend declarations, and preliminary profits statements, of the English Electric Co. and A.E.I. Last year, the announcements were made respectively on the 19th and 27th February, and a comparison may be made, incidentally, between the promptitude with which the accounts of these complex groups are presented and the delays which often occur in much simpler cases.

REPORTS and DIVIDENDS

Elliott Brothers (London), Ltd., has acquired the assets and goodwill of Bristol's Instrument Co., Weymouth, and entered into a licence agreement with the Bristol Co., of Waterbury, Connecticut. Mr. R. F. de Trafford, chairman of Elliott Bros., says that these arrangements should enable the company to effect considerable economies in development and production costs and to expand its activities in the process control field. The purchase consideration was approximately £235,000, of which £42,500 has already been paid. The balance can be spread over two and a half years and the directors consider that it could be provided out of future profits and certain stock reductions.

With a bank overdraft of about £290,000, the directors deem it prudent to issue further share capital and a meeting will be held on 1st March next to increase the authorized capital from £500,000 to £750,000, and to make possible an issue of 352,000 new 5s ordinary shares in the ratio of two new for five old. There is for the time being no intention to issue the balance of £292,000 of the authorized share capital. The issue price has not been finally fixed but 13s to 14s is indicated by the directors who state that it will be subject to the market conditions at the time of the offer. The new shares will rank for dividends declared in respect of 1954.

The Electrical and Industrial Investment Co., Ltd., reports that after providing £46,700 for taxation, the net profit for 1953 is £56,133, as compared with £44,958 for the preceding year. It is proposed to pay a deferred ordinary dividend for the year of 60 per cent (against 30 per cent), and to carry forward £15,983 (against £22,383 brought in). The directors state that three of the associated companies have converted into permanent capital sums attributable to interests of the equity holders which had been retained and employed in the development of their undertakings. As a result, the company's nominal holdings in those companies have been substantially increased.

The Decca Record Co., Ltd., in a preliminary statement, reports a trading balance of £1,310,000, as compared with £1,200,000 for 1951–52, from which is deducted depreciation, interest, etc., of £400,000 and taxation of £561,000. It is proposed to pay a final ordinary dividend of 1s 3d per 5s share, making 1s 9d per share for the year (equivalent to 35 per cent). This compares with a total of 1s 6d per 1s ordinary share (before the 400 per cent scrip issue), equivalent to 30 per cent on the present capital. A first interim of 3d per share is declared in respect of the current year (same) on larger capital.

It is proposed to make a "rights" issue of 200,000 new ordinary shares, and to split each existing 5s ordinary into one 4s ordinary and one 1s preference. The preference shares will then be consolidated into 5s shares. These new preference will rank for capital and dividend after the existing preference shares, will carry a fixed cumulative dividend of 25 per cent, and in a winding-up would be entitled to the distribution of 20s per share. Subject to approval, a new issue of 200,000 4s ordinary shares at 5s each will be made to ordinary shareholders in the proportion of one new for every thirteen shares held.

R. B. Pullin & Co., Ltd.—The accounts for the year ended 30th September last show a net profit of £98,703, as compared with £89,265 for the preceding year. Taxation requires £69,306 and general reserve receives £17,253. It is proposed to pay a final ordinary dividend of 10 per cent, making 15 per cent for the year. This is at the same rate as for the previous year but is paid on increased capital.

Cable & Wireless (Holding), Ltd.—Consent of the Capital Issues Committee has now been obtained to the proposed capitalization of £500,000 of general reserve and the issue of shares to ordinary stockholders on the basis of one new ordinary £1 share for each £10 of ordinary stock held. A resolution to give effect to the proposed issue will be submitted at the annual meeting to be held on 5th March.

Thomas W. Ward, Ltd., proposes to make a scrip issue of one new ordinary share for each £1 share held and to increase the capital to £4,000,000. The issue is subject to the consent of the Capital Issues Committee.

The Electric & General Investment Co., Ltd., proposes to give a capital bonus of 75,000 ordinary shares to existing stockholders.

Electric & Musical Industries, Ltd., has acquired a substantial but not a controlling interest in Sobell Industries, Ltd. The latter concern will remain a private company, and the new money put up by E.M.I. will be used to expand Sobell's facilities.

New Companies

Cook & Co. (Euston), Ltd.—Registered 30th January. Capital £2,000. Electrical engineers and contractors, radio, mechanical and general engineers, etc. Directors: A. J. Harvey and Mrs. Grace A. Harvey. Regd. office: 101, Hampstead Road, N.W.1.

Colne Electric, Ltd.—Registered 29th January. Capital £15,000. Designers, manufacturers, fitters, maintainers and repairers of and dealers in transformers, convertors, dynamos, etc. Directors: R. E. Beeson and E. H. Stoner. Regd. office: 3 and 5, Station Road, Watford.

Liquidations

Linton (London), Ltd.—Winding up voluntarily. Liquidator, Mr. P. Phillips, 76, New Cavendish Street, London, W.1, appointed 27th January.

Nickols & Hoff, Ltd., electrical engineers.—Winding up voluntarily. Liquidator. Mr. J. Hancock, Montgomery Chambers, Hartshead, Campo Lane, Sheffield, appointed 25th January.

Bankruptcies

H. Brown, 14, Abbey Drive, Luton, Beds., lately carrying on business at 109a, Park Street, Luton, radio and electrical engineer.—First meeting 15th February at the Official Receiver's office, 6, The Parade, Northampton. Public examination 11th March at the Court Nouse, Stuart Street, Luton.

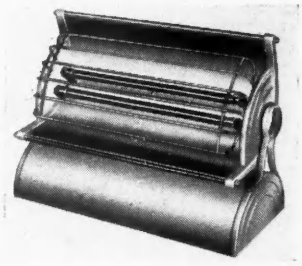
F. J. Hocken, residing at 95, Castleland Street, Barry Dock, Glam., fitter, lately carrying on business at 19, Vere Street, Cadoxton, Barry, and formerly at 3, Vere Street, Cadoxton, Barry, under the style of "Auto-Electric Services," as an electrical retailer and contractor.—Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver, released 2nd February, 1954.

E. Vasey, 21, Bridge Road, Bishopthorpe, York, electrician.—Last day for receiving proofs for dividend 20th February. Trustee, Mr. W. H. Meredith, 29, East Parade, Leeds, 1, Official Receiver.

NEW ELECTRICAL EQUIPMENT

Reflector Fires

THE LATEST addition to the range of electric fires manufactured by T. B. MORLEY & Co., LTD., Jameson Street, Hull, is the competitively priced "Trent" fire available in two sizes, 1 kW and 2 kW. Both models are fitted with adjustable reflectors and are suitable for voltages ranging from 200/220 and 230/250 V. The prices



"Trent" 2 kW reflector fire

are £2 14s (plus 19s 10d purchase tax in the United Kingdom) for the 1 kW fire and £3 8s (plus £1 4s 11d purchase tax) for the 2 kW model.

Oblong Frying-Pan

An addition to the range of "Tempo" cooking utensils announced by the ALMAG ENGINEERING CO., LTD., 46, Pembridge Road, London, W.11, is an unconventionally shaped oblong frying-pan. This appliance has a machined flat base and is suitable for use on electric hotplates or stoves.

Of die-cast alloy construction, with dimpled floor, it measures 10½in long by 8in wide and is provided with a heat-proofed detachable handle, making it suitable for oven use. The retail price is £1 1s 6d.

Measuring Instruments

Several new measuring instruments have recently been developed by the ELECTRICAL INSTRUMENT CO. (HILLINGTON), LTD., 3, Boswell Square, Hillington, Glasgow, S.W.2. The range of frequency meters has now been extended to cover between 15 and 10,000 c/s. Available in a variety of different sized cases, these instruments are based on the operation of two parallel double T bridges, one in balance above and one in balance below the reading range. The output of each bridge is rectified and the difference is indicated on the moving coil meter. The wave errors usual in rectifier meters are minimized as they tend to be cancelled by each other. This system of two opposing rectifiers can also be applied to measuring small differences between two alternating currents or voltages.

Though listed as a wattmeter, another new instrument actually indicates $I \times \cos \phi$ and may be calibrated in watts only at an assumed standard voltage. It is independent of voltage and is useful for direct indication of power losses by comparison with a plain ammeter, the manufacturers claiming that it gives more easily understood information than a power factor meter, at less cost. It has a further application for measuring milliamps in cases where the consumption of dynamometers is prohibitive.

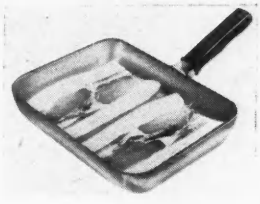
Notable advantages of a synchroscope are its low cost and low current consumption. Measuring differences of 1 in 10,000, it can be utilized for reading small phase angle differences between two tied frequencies at the same voltage and for the calibration of frequency bridges. It has a special application for measuring mechanical torque in the aircraft industry.

A fourth new instrument is a phase sequence indicator which may be calibrated for indicating correct or wrong sequence only or with the appropriate voltage.

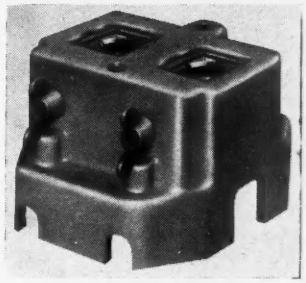
Bi-Post Lampholder

A new bi-post lampholder has recently been developed by the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2, for use with 1 kW, 2 kW and 5 kW "Mazda" studio lamps and 2 kW and 5 kW colour temperature lamps.

Cast in aluminium alloy, this lampholder combines the positive retention of the lamp, achieved by the use of



Above: Electrical Instrument Co. (Hillington) frequency meter. Below: "Tempo" oblong frying-pan



"Mazda" bi-post lampholder

wing-nut clamps, with fully floating sockets that exert no strain on the lamp terminals, while ensuring a complete electrical contact. The price of these lampholders is £3 3s each and they are not subject to purchase tax.

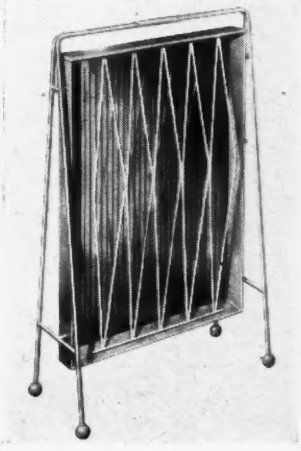
Universal Starter Switch

For the convenience of users of "Osram" fluorescent tubes in switch start circuits, the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has introduced a universal starter switch (OS 345 Model S.T. 26) for use on the voltage range 200/250 V a.c. with 3ft, 4ft, and 5ft tubes. The starter, price 6s, covers the duties hitherto performed by four different units. It is interchangeable with other universal glow starters.

Glass Panel Heater

With an attractive modern appearance, a glass panel electric heater now being manufactured by PREMIER ELECTRIC HEATERS, LTD., Keeley Street and St. Andrews Road, Birmingham, 9, is extremely effective in any setting and is completely safe to use. The 1 kW element is incorporated on the back of the armour plate glass panel and the heat is spread over the whole area. The panel is attractively illuminated by two amber lights. The position of the feet ensures good stability. In summer the heater can be used as a fire screen. The price is £9 10s 0d (plus £3 9s 5d purchase tax).

Premier glass panel heater



NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 15th February

BIRMINGHAM.—Birmingham Electric Club. "Generators for Water Power Plants," by E. M. Johnson and C. P. Holder.

BOURNEMOUTH.—Grand Hotel, Firvale Road, 8.15 p.m. A.S.E.E. Bournemouth Branch. "Electronic Control," by G. L. G. Jeans.

BRISTOL.—S.W.E.B. Colston Avenue, 6 p.m. I.E.E. Western Supply Group. "An Assessment of the Impregnated Pressure Cable," by Dr. L. G. Brazier, D. T. Hollingsworth and Dr. A. L. Williams.

IPSWICH.—Electric House, 6.30 p.m. Ipswich and District Electrical Association. Meeting followed at 7.30 p.m. by an open forum.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "Plan for Electricity," by G. K. Alston.

LONDON.—Savoy Place, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Teaching of the Subject of Insulating Materials," opened by Dr. Willis Jackson.

NEWCASTLE-UPON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. "Technical Arrangements for the Sound and Television Broadcasts of the Coronation Ceremonies on 2nd June, 1953," by W. S. Procter, M. J. L. Pulling and F. Williams.

Monday, 15th February, to Thursday, 25th February

LONDON.—Earls Court. British Furniture Trades Exhibition.

Tuesday, 16th February

ARBORFIELD.—R.E.M.E. Training Centre, Hazebrouck Barracks, 6.30 p.m. I.E.E. London Students' Section, district meeting. "Development of Electrical Aids in A.A. Gunnery," by D. H. A. Huddart.

CAMBRIDGE. — University Engineering Laboratory, Trumpington Street, 8 p.m. I.E.E. Cambridge Radio Group. "The Use of Radio in the Ascent of Everest," by G. C. Band.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. South-East Scotland Sub-Centre. Discussion on "Town Planning with Reference to the Electrical Engineer," opened by T. T. Hewitson.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Utilization Group. "Electricity in Farm Crop-Drying," by C. A. Cameron Brown and P. G. Finn-Kelcey.

LIVERPOOL.—Merseyside and North Wales Electricity Board, Whitechapel, 6 p.m. I.E.S. Liverpool Centre. "The Application of Fluorescent Tubes in Transport Lighting," by S. Anderson.

LONDON.—Central Hall, Westminster, 6 p.m. Institution of Electrical Engineers, Faraday Lecture: "Electro-Heat and Prosperity," by O. W. Humphreys.

2, Savoy Hill, 6.30 p.m. Association of Supervising Electrical Engineers. "The Engineer in Management," by H. Bainbridge.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilization Group. "Electric Lifts in Post-War Housing," by C. G. L. Morley.

NOTTINGHAM.—At the Gas Department Demonstration Theatre, 6.30 p.m. I.E.E. East Midland Centre. "Design Features of Certain British Power Stations," by S. D. Whetman and A. E. Powell.

OLD PORTSMOUTH. — B.E.A. Conference Rooms, High Street, 7.30 p.m. A.S.E.E. Portsmouth Branch. Lecture.

ROCHESTER.—Bull Hotel, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Steam Storage," by Dr. E. G. Ritchie.

RUGBY.—College of Technology and Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Electricity in the Wool Textile Industry," by A. J. Francis and T. H. Carr.

STAFFORD.—At the English Electric Co.'s Lecture Theatre, 7.15 p.m. I.E.E. North Staffs Sub-Centre Students' Section. Students' lecture, "Electrical Safety Precautions," by H. W. Swann.

STOKE-ON-TRENT.—31, Kingsway, 5.45 p.m. E.I.B.A. North Staffordshire Branch. General meeting.

SWANSEA.—Mackworth Hotel, 7.30 p.m. Incorporated Plant Engineers, South Wales Branch. "The Selection and Maintenance of Ball and Roller Bearings."

Tuesday, 16th February, to Friday, 19th February

GLASGOW.—Kelvin Hall. Scottish Dairy Show.

Wednesday, 17th February

BRISTOL.—Grand Hotel, 7.15 p.m. Incorporated Plant Engineers, Western Branch. "The Generation of Industrial Power from Process Steam," by Dr. E. G. Ritchie.

CARDIFF.—Ministry of Labour Offices, Westgate Street, 7 p.m. A.S.E.E. South Wales Branch. Films.

GLASGOW.—425-427, Sauchiehall Street, 7 p.m. Incorporated Plant Engineers, Glasgow Branch. "Industrial Lighting," by F. H. Fielder.

LONDON.—At the School of Hygiene & Tropical Medicine, Keppel Street, 6.30 p.m British Institution of Radio Engineers, London Section. "Electronics in Film Making," by W. D. Kemp and B. R. Greenhead.

MANCHESTER.—Engineers' Club, Albert Square, 6.30 p.m. I.E.E. North-Western Radio Group. "The Reproduction of Signals Recorded on Magnetic Tape," by E. D. Daniel and Dr. P. E. Axon.

Engineers' Club, Albert Square, 7.30 p.m. A.S.E.E. Manchester Branch. Members' problems.

MIDDLESBROUGH.—Cleveland Scientific & Technical Institution, Corporation Road, 6.30 p.m. I.E.S. Tees-Side Group. "Airport Lighting," by H. M. Ferguson.

Cleveland Scientific and Technical Institution, Corporation Road, 6 p.m. North East Coast Institution of Engineers & Shipbuilders, Tees-Side Branch. "First Stage Reconstruction of Portobello Power Station, Edinburgh," by T. P. Everett.

NOTTINGHAM.—E.M.E.B. Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "Problems in Modern Lift Control," by H. E. Baxter and J. McEnery.

OXFORD.—S.E.B. 37, George Street, 7 p.m. I.E.E. district meeting. "The Maintenance Engineer Atomised," by J. R. Catlin.

PRESTON.—19, Friargate, 7.15 p.m. I.E.S. North Lancashire Group. "A Short Investigation into Stroboscopic Effect," by E. Smith.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. "The Technique and Development of Automatic Winding in Mine Shafts," by B. L. Metcalf and G. Cuttle.

SHEPPERTON.—I.E.E. London Students' Section. Visit to London Film Studios at 2.15 p.m.

SOUTHAMPTON.—Polygon Hotel, 8.15 p.m. A.S.E.E. Southampton Branch. Lecturettes.

WIMBLEDON.—Guild House, 32, Worple Road, 8.15 p.m. A.S.E.E. South West London Branch. "Electric Water Heating," by L. L. Hughes.

Thursday, 18th February

BLACKBURN.—Grosvenor Hotel, Lord Street, 7.30 p.m. Incorporated Plant Engineers, Blackburn Branch. "Fire Protection for Industrial Buildings," by A. Jackson.

CHATHAM.—Sun Hotel, 7.15 p.m. Institute of Welding, Medway Section. "Aluminium Welding for Ship Building," by P. T. Houldcroft.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "The Physics of Nuclear Energy Release," by Prof. E. T. S. Walton.

KETTERING.—George Hotel, 7.30 p.m. I.E.E. East Midland Centre, district meeting. "Overhead Distribution," by H. W. Grimmitt.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Utilization Section. "Electronic Motor Control," by A. O. Dalton. "Arc-Quenching Circuits," by B. H. Stonehouse. "A Survey of the Principles of the Contact Rectifier," by D. R. Smith.

Caxton Hall, Westminster, 2.30 p.m. Diesel Engine Users' Association. "Diesel Engines in Agriculture," by R. M. Ogorkiewicz.

SOUTHAMPTON.—Guildhall, 6.30 p.m. I.E.E. Southern Centre. Faraday Lecture, "Electro-Heat and Prosperity," by O. W. Humphreys.

TONBRIDGE.—Bridge Café, 32, High Street, 8 p.m. A.S.E.E. Kent Branch. Lecture.

Friday, 19th February

BELFAST.—Grand Central Hotel, 7.30 p.m. I.E.E. Northern Ireland Centre. Dinner-dance.

DUNDEE.—Taypark Hotel, West Ferry. Incorporated Plant Engineers, Dundee Branch. Annual dinner and dance.

LONDON.—Caxton Hall, Westminster, 6.30 p.m. E.P.E.A. Southern Meter Engineers Group. "Modern Meter Test Sets and Meter Testing," by A. W. Angold.

Connaught Rooms, W.C.2, 12.15 for 12.45 p.m. Electrical Trades' Commercial Travellers' Association. Annual luncheon.

MANCHESTER. — Engineers' Club, Albert Square, 6.45 p.m. Manchester Association of Engineers. "Sound Absorption," by F. G. Ewing.

SHEFFIELD.—Grand Hotel, 7 for 7.30 p.m. Institute of Metal Finishing, Sheffield and North-East Branch. Dinner and dance.

STONE.—Duncan Hall, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "A Short Modern Review of Fundamental Electromagnetic Theory," by P. Hammond.

Machinery Trades Convention

THE fifth annual Convention of the Association of Electrical Machinery Trades will be held at the Hotel Grosvenor, Swanage, Dorset, from 25th to 27th April next. The programme includes the Council meeting, a luncheon, a paper on "The Electrical Uses of Carbon" and a dinner and dance on 26th April, and a paper on "Variable Speed Motors for use on A.C. Supply" and a luncheon on the following day. Wives and friends of members are invited.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 24th March from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

8190. Standard Telephones & Cables, Ltd.—Phase changing device for electric circuits. 15th March, 1946. Addition to 685990. (706090.)

1948

3847. Compagnie Générale de Télégraphie sans Fil.—Travelling-wave oscillator. 10th February, 1948. (706001.)

1949

15289. General Electric Co., Ltd., Bowtell, J. N., Jenkins, H. G., and Miles, E. E.—Low-pressure mercury vapour positive column electric discharge lamps. 16th May, 1950. (706004.)

17401. Electric & Musical Industries, Ltd. —Cathode-ray tube apparatus. 28th June, 1950. (706005.)

1950

2449. Electric & Musical Industries, Ltd.—Modulated carrier-wave apparatus. 12th January, 1951. (705901.)

5074. Standard Telephones & Cables, Ltd. —Signalling arrangements for multi-channel telecommunication systems. 23rd February, 1951. (706010.)

5378. Cathodeon, Ltd.—Television pick-up devices. 24th April, 1951. (706173.)

9754. British Dielectric Research, Ltd.—Methods of processing polytetrafluoroethylene and products therefrom. 19th April, 1951. Cognate application 22902, 18th September, 1950. (706012.)

12341. Automatic Electric Laboratories, Inc.—Telephone subsets. 17th May, 1950. (706013.)

12584. Muirhead & Co., Ltd.—Electrolytic recorders adapted more particularly for use as facsimile receivers in picture telegraphy. 26th April, 1951. (706014.)

16259. Babcock & Wilcox, Ltd.—Joints between austenitic steel tubes or pipes and ferritic steel tubes or other elements. 25th June, 1951. (706015.)

17453. Compagnie Générale de Télégraphie sans Fil.—Space-charge wave-discharge tubes. 12th July, 1950. (706094.)

20922. Electric & Musical Industries, Ltd.—Television systems. 20th August, 1951. (706182.)

26458. Siemens-Reiniger-Werke, Akt.-Ges. —Betatrons. 30th October, 1950. (706186.)

30564. General Electric Co., Ltd.—Apparatus for viewing television and other images on the screens of cathode-ray tubes. 12th December, 1951. (706190.)

31262. Research Corporation.—Electrical gas cleaning apparatus. 22nd December, 1950. (706191.)

1951

927. Morphy-Richards, Ltd.—Thermally operated electric switches. 7th April, 1952. Cognate application 22170, 21st September, 1951. (705918.)

1054. Babcock & Wilcox, Ltd.—Cyclone furnaces. 15th January, 1951. (706032.)

4178. Electric & Musical Industries, Ltd.—Thermionic valve circuits employing coaxial line coupling circuits. 22nd January, 1952. (705924.)

4746. Babcock & Wilcox, Ltd.—Tubulous fluid-heating units fired by pulverized fuel. 26th February, 1952. (706110.)

5343. M-O Valve Co., Ltd., and Widdowson, A. E.—Electric-discharge devices. 29th February, 1952. (706195.)

5734. National Research Development Corporation.—Thyratron control circuits. 10th March, 1952. Cognate application 23949, 15th October, 1951. (706114.)

5945. Skogsberg, E. L.—Telephone systems. 12th March, 1951. (706198.)

6518. British Insulated Callender's Cables, Ltd.—Tool for forming a bell-mouth at the end of a pipe. 18th March, 1952. (706116.)

7152. Electric & Musical Industries, Ltd.—Electronic storage tubes. 28th March, 1952. (706199.)

8696. Mullard Radio Valve Co., Ltd.—Cold cathode gas discharge tubes. 28th March, 1952. (706201.)

11625. National Research Development Corporation.—Electrical circuits using cold cathode gaseous discharge tubes. 9th May, 1952. (705935.)

12765. Bendix Aviation Corporation.—Magnetic modulators or amplifiers. 30th May, 1951. (706039.)

13420. Pensabene, N.—Electric induction motors. 19th December, 1951. (705937.)

14347. Revo Electric Co., Ltd.—Electric cartridge fuses. 18th June, 1952. (706206.)

15137. Philips Electrical Industries, Ltd.—Relaxation oscillation generators embodying gas-filled discharge tubes. 26th June, 1951. (706258.)

16869. Yardney International Corporation. —Manufacture of plates for electric batteries and accumulators. 16th July, 1952. (706211.)

17448. Hadley, V. J., and Hadley, N. C. (trading as Hadley Sound Equipments).—Coin freed switch mechanism. 23rd October, 1952. (705941.)

20277. General Electric Co., Ltd., Aspin, J. J. E., Bryden, J. E., Russell, C. R., and Stenning, L. C.—Electric signalling systems. 11th August, 1952. (705946.)

21204. Klein, A.—Clamps for fixing cables, pipes and the like. 7th September, 1951. (705947.)

21560. General Electric Co., Ltd.—Multi-channel electric pulse signalling systems. 4th September, 1952. Addition to 663782. (706047.)

22052. Hare, W. E. E.—Electrolysis apparatus. 15th September, 1952. (706219.)

23386. Forges et Ateliers de Constructions Electriques de Jeumont.—Terminal devices for facilitating the testing of electric circuits. 8th October, 1951. (705952.)

23401. Radio-Industrie Soc. Anon.—Picture analysis and recording devices. 8th October, 1951. (705953.)

23457. Philips Electrical Industries, Ltd. —Testing circuits for use in automatic telephone exchange and like systems. 9th October, 1951. (706221.)

24446. British Ferrograph Recorder Co., Ltd., and Niblett, E. H.—Magnetic recording or reproducing apparatus. 16th July, 1952. (706267.)

24633. Enfield Cables, Ltd.—Fused electrical plug connectors. 22nd October, 1952. (705956.)

24679. Sanderson, R. B., and Hulme, M. R. —Manufacture of electrically heated utensils. 20th October, 1952. Cognate application 15043, 16th June, 1952. (705957.)

25004. General Electric Co., Ltd., and Wilson, E.—Electric wafer switch assemblies. 22nd October, 1952. (705958.)

26799. Littmann, R.—Moving coil diaphragms for electrodynamic sound transmitting and receiving devices. 15th November, 1951. (705965.)

28593. Hoover, Ltd.—Suction cleaners. 6th December, 1951. (706144.)

1952

1517/9. General Electric Co., Ltd., Biggs, A. J., and Ribchester, E.—Sound rejection circuits for television receivers. 15th January, 1953. (706065/6.)

2286. Compagnie Générale de Télégraphie sans Fil.—Process of manufacturing insulating high dielectric constant materials, and application to the manufacture of capacitors. 28th January, 1952. (706067.)

2421. Naamlooze Vennootschap Hollandsche Draad-en Kabelfabriek.—Electric cables. 29th January, 1952. (706231.)

2461. Cole, Ltd., E. K., and Bilski, S.—Radio direction finders. 28th January, 1953. (706069.)

2748. Philips Electrical Industries, Ltd.—Electric discharge tubes. 1st February, 1952. (705977.)

2896. Tardel, K.—A.c. generators. 4th February, 1952. (706233.)

3727. T.M.M. (Research), Ltd.—Means for stabilizing the speed of an electric motor. 3rd February, 1953. (706071.)

6665. Western Electric Co., Inc.—Directional couplers for electromagnetic wave transmission systems. 14th March, 1952. (706234.)

7016. Maupas, C. F. E.—Combined thermal and electromagnetic overload relay. 18th March, 1952. (706284.)

9351. Nedalo N.V.—Electrostatic precipitators. 15th April, 1952. (706152.)

9664. Babcock & Wilcox, Ltd.—Joints between tubes and pressure elements. 17th April, 1952. (706287.)

9690. Philips Electrical Industries, Ltd.—Methods of manufacturing electric discharge tubes. 17th April, 1952. (706237.)

11054. Marconi's Wireless Telegraph Co., Ltd.—Time-base transformer circuit arrangements of the booster-damper type. 5th February, 1953. (705985.)

12598. Philips Electrical Industries, Ltd.—Circuits for automatically tuning the output circuits of high-frequency oscillation generators. 19th May, 1952. (706242.)

12836. Liebel-Flarsheim Co.—X-ray machine and diaphragm assembly therefor. 21st May, 1952. (706082.)

14316. Philips Electrical Industries, Ltd.—Electrical components comprising metallic casings. 6th June, 1952. (706244.)

14493. Akt.-Ges. Brown, Boveri & Cie.—Gas-filled electrical generator. 9th June, 1952. (705988.)

14975. Sylvania Electric Products, Inc.—Filament interruption detection. 13th June, 1952. (706245.)

15098. Aktiebolaget Bofors.—Electrically operated remote control systems. 16th June, 1952. (706294.)

15823. Soc. Anon. de Télécommunications. —Telecommunication station equipment. 23rd June, 1952. (706246.)

17942. Ebauches Soc. Anon.—Method for comparing the frequencies of two high-frequency generators and apparatus for carrying out this method. 16th July, 1952. (706298.)

18206. Tull, R. G.—Device for the testing of the electrical circuits of a power driven vehicle. 18th July, 1952. (706299.)

18876. British Thomson-Houston Co., Ltd. —Radiating structures for ultra-high frequencies. 25th July, 1952. (706301.)

(*Continued on next page*)

18919. British Insulated Callender's Cables, Ltd.—Manufacture of electric cables. 24th July, 1953. (706086.)

20726. Busch-Jaeger Ludenscheider Metallwerke Akt.-Ges.—Electric plug-and-socket connectors. 18th August, 1952. (706247.)

21158. Köster, K., and Hossfeld, W. (trading as Von Der Crone & Co., C.).—Electric lighting fittings. 22nd August, 1952. (705995.)

22881. Soc. Italiana E. Breda per Costruzioni Meccaniche.—Apparatus for the automatic regulation of the generating set of an electrically propelled vehicle. 11th September, 1952. (705996.)

22952. Philips Electrical Industries, Ltd.—Supports for low-pressure mercury vapour discharge tubes. 12th September, 1952. (706248.)

27623. General Electric Co.—Compressors for refrigerators. 3rd November, 1952. (705999.)

28205. Telefunken Ges. für Drahtlose Telegraphie.—Circuits for generating sawtooth currents. 10th November, 1952. (706167.)

30366. Standard Telephones & Cables, Ltd.—Cable fasteners. 1st December, 1952. (706168.)

31172. Standard Telephones & Cables, Ltd.—Mounting of piezo-electric crystals. 9th December, 1952. (706169.)

32321. Hoover, Ltd.—Electric motors. 19th December, 1952. (706170.)

1953

16762. British Dielectric Research, Ltd.—Methods of processing polytetrafluorethylene and products therefrom. 19th April, 1951. Cognate application 16763, 18th September, 1950. Divided out of 706012. (706089.)

Amended Specifications

651430. Staatsbedrijf der Posterijen Telegrafie en Telefonie.—Apparatus for receiving signals converted from a code comprising one fixed number of units into a code comprising another fixed number of units.

655725. Electric & Musical Industries, Ltd.—Sawtooth waveform generators.

679410. Belling & Lee, Ltd.—Electric cable end connectors.

689144. Loewe Opta Akt.-Ges.—Magnet system arrangement for magnetic sound carriers.

LIGHTING NOTES

CHOICE of lighting equipment for railway sidings is governed by various considerations, which include the layout of tracks, their position relative to running lines, and whether the sidings are used for storage or marshalling of wagons. If the number of sidings in a group is not large, lanterns may be mounted on columns in rows at each side of a "grid" of tracks. This arrangement has been adopted in the sidings at Calverton Colliery, Notts, which are at the end of a branch line so that it was unnecessary to give special attention to directional lighting or to its colour to avoid confusion with mainline signalling. In this installation, in fact, it has been possible to use a normal sodium street lighting lantern. The General Electric Co., Ltd., supplied some 80 lanterns of this type for the scheme with "Osram" 140 W sodium lamps. In the lantern adopted, the lamp is enclosed by a dish of "Perspex," with refractor plates cemented to its sides for light control. The ends of the dish are roughened to diffuse the light. The lanterns are mounted 25ft above ground level on Stanton "6F" reinforced concrete columns. Spacing between the columns in each row is 120ft for most of the length of the sidings, but they are placed closer together at the entry to each group of tracks so as to provide additional lighting in the points area. The installation was planned in conjunction with Mr. H. Drury, chief engineer, No. 6 Area, National Coal Board.

Experiments with a road surfacing material that will combine cheapness, good surface characteristics, and good reflectivity are being carried out by the Road Research Laboratory. A length of road at SLOUGH (Bucks) will have various materials laid to incorporate different means of improving light reflection.

MIDDLESBROUGH Watch and Licensing Committee is recommending an expenditure of £40,000 on improvements to the town's street lighting. It has been estimated that it would cost £120,000 to bring the lighting system up to an adequate standard. The Committee is also recommending the provision of lighting on the Berwick Hills and Park End housing schemes at £9,500 and improvements to lighting in private streets at £3,000.

BRIDGWATER Town Council has adopted a scheme for extending the system of sodium street lighting during the next five years at an estimated cost of £14,860. Priority is to be given to sodium lighting along all approaches to the borough.

SALFORD Street Lighting Committee recommends the City Council to seek sanction to borrow £14,567 for the improvement of street lighting in Eccles New Road, Liverpool Street and Langworthy Road.

GUILDFORD Works Committee recommends that a scheme should be prepared for Class "A" lighting along the London road between the A.A. offices and the borough boundary.

BARNES Corporation has been recommended to approve in principle a scheme, estimated to cost £32,680, for the improvement of the main road lighting and for the replacement and maintenance of equipment for side road lighting.

EXETER Lighting and Cleansing Committee has been informed that the Minister of Housing and Local Government has been recommended to sanction the borrowing by the City Council of £12,878 for carrying out the remainder of the main street lighting.

Electric street lighting schemes being considered by the STOCKTON-ON-TEES Town Council include trunk road A.19 (£21,080), trunk roads A.67 and 175 (£9,500), and class two road B.1274 (£7,580).

Approval has been received by SUTTON COLDFIELD Highways Committee of plans to complete the street lighting on the Falcon Lodge estate at an estimated additional cost of £4,500.

GRANTHAM Council is to submit to the Ministry of Transport for approval a scheme for converting the whole of the town's gas street lighting to electricity.

STALYBRIDGE Corporation is applying for consent to borrow £6,160 for the Huddersfield Road lighting scheme.

Street lamps are to be erected on the Church Farm housing estate, SCUNTHORPE, at a cost of £4,806.

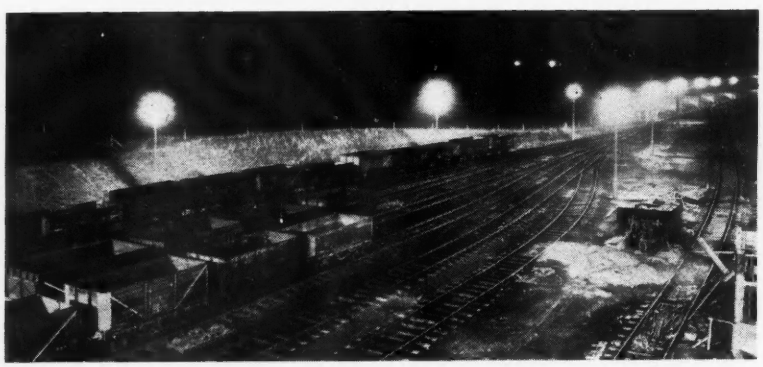
DURHAM City Council is planning street lighting schemes in North Road (£1,390), Market and Claypath (£1,900), and Sunderland Road (£1,375).

LEYTON Corporation is recommended to approve the preparation of a progressive scheme for improving street lighting in the borough.

A £5,895 plan for better street lighting at LICHFIELD has been approved by the City Council.

SOUTH SHIELDS Town Council is to spend £4,000 improving the electric street lighting of Chichester Road and Imeary Street, South Shields.

Illumination of Calverton Colliery sidings by means of "Osram" 140 W sodium lamps in G.E.C. enclosed lanterns



CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — BRISBANE. — 21st April. State Electricity Commission of Queensland. Arc suppression coil. (E.S.B. 2692/54. Ten/8266.)*

28th April. Two 7,500 kVA transformers. (E.S.B. 3106/74. Ten/8267.)*

Belfast.—26th February. Electricity Department. Chains for cranes; condenser tubes; and ferrules. (See this issue.)

Chadderton.—20th February. U.D.C. Lamps for one year. Surveyor, Town Hall.

Durham.—R.D.C. Electrical goods for the maintenance of Council houses. K. G. Miller, surveyor, Byland Lodge, Durham.

East Riding.—24th February. County Council. Lamps for one year. Supplies officer, County Hall, Beverley.

Formosa. — TAIPEI. — 1st March. Central Trust of China. Survey signal lamps. (E.S.B./2656/54. Ten/8231.)*

India. — NEW DELHI. — 16th February. Directorate General of Supplies and Disposals. Magnets for 4 bar generators. (E.S.B./2745/54. Ten/8227.)*

22nd February. P.i.l. (alloy E) cable. (E.S.B. 2743/54. Ten/8229.)*

18th March. Electric cables and cords. (E.S.B. 3147/54. Ten/8263.)*

Irish Republic. — CASTLEBAR (MAYO). —13th March. Mayo County Council. Pumping plant, including four electric motors or four diesel engines. (E.S.B. 3051/54. Ten/8252.)*

Irlam.—27th February. U.D.C. Lamps for one year. Surveyor, Council offices.

Leeds.—1st March. City Transport Committee. Lamps for one year. General manager, Transport Department, 1, Swinegate.

Mitcham.—27th February. Corporation. Street lighting equipment. (See this issue.)

New Zealand. — AUCKLAND. — 26th February. Auckland Electric Power Board. H.v. cable. (E.S.B. 3230/54. Ten/8264.)*

WELLINGTON.—11th March. Post and Telegraph Department. Switchboard wire. (E.S.B. 2785/54. Ten/8209.)*

26th March. Cartridge fuses. (E.S.B. 2781/54. Ten/8254.)*

Pakistan. — KARACHI. — M/S. Jubilee Spinning and Weaving Mills, Dada Manzil, Khori Garden. Cables, distribution switchgear, lighting equipment, etc., for mills under construction. (E.S.B. 3156/54. Ten/8261.)*

24th March. Purchase Co-ordinating Officer, Posts and Telegraphs Directorate. H.f. radio communication network in the Baluchistan area. (E.S.B. 3173/54. Ten/8269.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

Peterborough. — Corporation. Electrical installations in 100 houses. (See this issue.)

Sedgefield (Durham). — R.D.C. Installation of electricity in 130 houses at Ferryhill, 38 at Chilton Buildings and 64 at Trimdon Village. Housing architect, Council Offices, Sedgefield, Co. Durham.

South Africa. — PRETORIA. — 25th February. Public Works Department. Electrically operated laundry equipment. (E.S.B. 3021/54. Ten/8234.)*

Stockton-on-Tees. — 15th February. Town Council. Electrical installations in seven shops and five flats, Roseworth estate. T. C. Hartley, borough architect, 28, The Square.

United States. — PORTLAND (ORE.). — 25th February. Department of Interior, Bonneville Power Administration. Two 15,000 kVA and two 12,000 kVA power transformers. (E.S.B. 2967/54. Ten/8256.)*

DENVER.—25th February. U.S. Bureau of Reclamation. Instrument transformers for the Casa Grande substation, Davis Dam Project, Arizona, Nevada. (E.S.B. 2991/54. Ten/8262.)*

Uruguay. — MONTEVIDEO. — 18th February. Facultad de Medicina, Hospital de Clinicas. Apparatus for radiology. (E.S.B. 2824/54. Ten/8219.)*

23rd February. Administracion Municipal de Transportes Colectivos de Montevideo. 200 alkaline batteries (6 V) for motor buses, and accessories, or alternatively 100 acid batteries (12 V). (E.S.B. 2721/54. Ten/8199.)*

Warrington.—22nd February. R.D.C. Street lighting equipment. (See this issue.)

Wigan.—26th February. Corporation. Power operated tower wagon. (See this issue.)

ORDERS PLACED

Bridgwater.—Corporation. Installation of two 35 b.h.p. electrically operated motors, switchgear, etc., at Ashford Waterworks No. 2 pumping station (£1,148). — South Western Electricity Board.

Castle Ward (Northumberland).— R.D.C. Electrical installations in 146 houses at Brunswick Village. (£5,987).— Bernard Berrie.

Ealing. — Highways Committee. Recommended. Lanterns for street lighting in Western Avenue (£2,245).— British Thomson-Houston Co.

Hendon.—Corporation Housing Committee. Electrical installations. Spur Road housing scheme (£4,346).—Eastern Electricity Board.

London. — KENSINGTON. — Borough Council. Recommended. Twenty-five double bracket and 50 single bracket street lighting columns (£1,881).—G.E.C.

Longbenton (Northumberland).— U.D.C. Electrical installations in houses at Forest Hall.—J. G. Patton (228), A. F. Jemison (82) and Forest Electrics, Ltd. (22).

Paignton.—U.D.C. Street lighting on "A" roads.—Cohen Bros. (Electrical), Ltd.

Washington (Durham). — U.D.C. Electrical work in 50 houses in Oxford Avenue (£1,175).—W. Hinton, Blaydon-on-Tyne.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham.—Houses (112), Broomwood estate; Marsden & Chapman, Ltd., Timperley, Ches.

Aylsham (Norfolk). — Secondary modern school, Sir William's Lane; W. O. Bell, chief education officer, Stracey Road, Norwich.

Bebington.—Houses, Glenburn estate (42), and Mill Park estate (74); borough surveyor.

Bingley.—Adaptation of Bingley Hippodrome as a new store; F. W. Woolworth & Co., Ltd., Martins Bank Buildings, Water Street, Liverpool (W. L. Swinnerton).

Birmingham.—Three-storey flats (90) in Rupert Street, nursery school in Rednal Road, West Heath, special schools for deaf and physically handicapped children in Perry Common Road and two county primary schools in Hilary Grove, Northfield; E. L. Russell, chief education officer.

Cardiff.—Hostel for maladjusted children in North Wales, erection of a new building at St. David's Hospital, Carmarthen (£60,000), and new villa at North Wales Mental Hospital (£24,000); Welsh Regional Hospital Board, Temple of Peace and Health, Cathays Park, Cardiff.

County secondary school for girls, Heol Hir; E. R. Bugden & Partners, architects, 95–97, St. Mary Street, Cardiff.

Carlisle.—Works extensions; J. K. Innes & Co., Ltd., engineers, 4, Laws Lane.

Consett. — Engineering factory for North-East Trading Estates, Ltd., on behalf of Light Fabrications, Ltd.; H. Ayton & Son, builders, George Street, Blackhill.

Houses (28), Moorside, for U.D.C.; Eltringham & Lowes, architects, Derwent Street, Blackhill.

Corby (Northants).—Eleven shops, some with flats above (£56,500); Council's architect.

Darlington.—First stage of proposed college of further education (£63,000); borough architect, Central Buildings.

Daventry. — Factory for Daventry Engineering Co., Ltd.; Haynes & Sons (Daventry), Ltd.

Derby.—Developments at Derby City Hospital; Young & Hall, architects, 9, Southampton Row, London, W.C.1.

Doncaster.—Secondary modern school for boys in Hills Lane, Wheatley; borough architect, 15, South Parade.

Enfield.—Works extensions; Reeves & Son, Ltd., Lincoln Road.

Branch library, Bullsmoor Lane estate; U.D.C. surveyor.

Gainsborough.—Fire and ambulance station; A. Ronald Clark, architect, County Offices, Lincoln.

Goole.—Farm buildings, Corner Farm, Rawcliffe; county land agent, County Hall, Wakefield.

Gosport.—R.C. primary school; Wilfrid C. Mangan, architect, 2, Ribblesdale Place, Preston.

Grimsby.—New King Edward VI Grammar School for Girls; J. V. Oldfield, borough surveyor, Municipal Offices, Town Hall Square.

Halesowen.—Houses (95), Dunstall Road and Fallowfield Road, Hasbury Farm estate, for A. & J. Mucklow, Ltd.

Harlech.—Secondary school; Richards & Trollope, architects, 14, Sackville Street, London, W.1.

Houghton-le-Spring.—Houses (262) near Tne Burn; U.D.C. surveyor.

Hyde.—Houses (92), Dukinfield Road; borough surveyor.

Ipswich.—Infants' school, Aster Road; Johns & Slater, architects, 32, Foundation Street.

Ivybridge.—Admission block for Moorhaven Hospital; South Western Regional Hospital Board, 27, Tyndalls Park Road, Clifton, Bristol.

London. — BERMONDSEY. — Dwellings (77), Raymouth Road; Stock, Page & Stock, architects, Fanshaw House, Fanshaw Street, N.1.

Warehouse and wharf reconstruction, Shad Thames; Butler's Wharf, Ltd., Lafone Street, S.E.1.

LEWISHAM.—Crematorium at Hither Green; borough engineer.

PECKHAM.—Additional factory premises; W. J. Harris & Co., Ltd., Haymerle Road, S.E.15.

STEPNEY.—Three-storey block of flats and maisonnettes, Cephas Street; borough engineer, 227–233, Commercial Road, E.1.

Maidenhead.—Factory on the Curls Lane site; Ellay Tubes, Ltd., Cox Green works.

Maidstone.—Heat treatment works; Tilling-Stevens, Ltd., St. Peter Street.

Newcastle-on-Tyne. — Civil engineering department at King's College (£120,000); Leslie & Co., Woodlands Road, Darlington.

Rebuilding premises, Clayton Street, after fire; Howards Stores (Newcastle), Ltd.

Newport (Mon.).—Warehouse in Cardiff Road; Whitehead Iron & Steel Co., Ltd., Courtybella Works.

Newton Abbot.—Factory extensions; Premier Caravans, Ltd., Harlington Works, Kingsteignton Road.

Northampton.—"Drury" houses (50), Hardingstone; R.D.C. architect, Northampton.

Northumberland.—Large engineering workshops to cost between £250,000 and £500,000 at Ashington for Northern Coal Board, Newcastle-on-Tyne.

Oldham.—Shops near the market ground (£10,000); borough engineer.

Oswestry.—Houses (76), Middleton Road, Stage 6; J. E. Taylor, borough surveyor, Guildhall.

Peterlee.—Proposed technical college; county architect, Durham.

Portsmouth.—Flats and maisonnettes (40), Hanover Street; P. McG. Corsar, architect, 103, Commercial Road.

Preston.—Ashton county secondary school; Hoare, Lea & Partners, electrical and heating consultants, 32, Deansgate, Manchester.

Rawtenstall.—Extensions at Rossendale General Hospital to provide accommodation for resident medical staff; Leonard Franklin (Contractors), Ltd., Antley Garage, Blackburn Road, Church, Accrington.

Reigate.—Secondary school, Carlton Road; Slater, Uren & Pike, architects, 29, Gower Street, W.C.1.

Rochdale.—Secondary school, Spotland; T. Partington & Son, Ltd., Palm Buildings, Chadderton.

Rowley Regis.—Church hall for Rev. H. Card (£12,000); S. Griffiths, architect, Stourbridge, Worcs.

Scarborough.—Houses (213) for T.C. Builders: C. R. Coates, Ltd., Westborough, Scarborough (36 houses); Mollekin Bros., West Parade Road, Scarborough (40); A. Schofield, Ltd., St. Bedes, Hornsea (43); F. Shepherd & Son, Falsgrave Road, Scarborough (48); and E. Hunter, Ltd., Beaconsfield Street, Scarborough (46).

Sheffield.—Dwellings (144), Greenhill estate; city architect.

Shotley Bridge (Co. Durham).—Factory for A. Bolton & Co., colliery engineers, Shotley Bridge.

Sleagill (Cumberland). — Methodist church hall; Robert E. Reay, Penrith.

Southport.—High school for girls; acting borough architect.

South Shields.—Houses (42) and three shops, Sunniside estate, for Sir R. Chapman; G. R. Smith & Partners, architects, Charlotte Terrace.

Stalybridge.—Houses (92), Copley estate; Howard & Benson, architects, 88, Mosley Street, Manchester.

Stevenage.—Houses, flats, blocks of shops, maisonnettes and factories for the Development Corporation; chief administrative officer, Aston House, near Stevenage, Herts.

Stockport.—R.C. school at Nangreave Road; Reynolds & Scott, architects, 9, Albert Square, Manchester.

Stockton-on-Tees.—Houses (60) west of Hartburn Avenue; G. Hope, builder, Bishopton Road, Stockton.

Sunderland.—Houses (64), Park House Farm; R.D.C. surveyor.

R.C. church, Springwell estate; Reavell & Cahill, Lloyds Bank Chambers, Alnwick.

Sutton (Surrey).—Clinic, Stonecott Hill; J. Harrison, architect, County Hall, Kingston-on-Thames.

Tipton.—Dwellings (86), Coneygree Road site; housing architect.

Torquay.—Dwellings (53), Rock End estate; F. T. Stoeman, Ltd., 49, St. Margaret's Road, St. Marychurch.

Walsall.—T.A. Centre for Staffs T. & A.F. Assen.; G. W. Roberts Pike, architect, 8, North Street, Wolverhampton.

Wellingborough.—Twelve shops and 23 flats and maisonnettes, Marrymoor Road; Drabble Construction Co., Ltd., Bank Chambers, Rushden.

Whitley Bay.—Stores, Whitley Road; F. W. Woolworth & Co., Ltd., 1, New Bond Street, London, W.1.

Whittlesey (Cambs).—Further 40 houses; U.D.C. architect.

Worksop.—C.P. school at Kilton Hill; J. E. Smith (Worksop), Ltd.

West German Imports

ELECTRO-TECHNICAL products, including machinery, were imported into Western Germany during the first six months of 1953 to the value of DM 38·5 million compared with DM 29·9 million during the corresponding period of the previous year. Comparative figures of some of the more important groups of imports are shown in the accompanying table, together with the leading suppliers. (£1 = 11·76 DM.)

Class of Equipment	Jan.-June 1953 DM (000)	Inc. or dec. DM (000)
Generators and motors up to 10 kW ..	920	+ 128
From Saar ..	453	+ 138
„ *Switzerland*	159	— 41
Ditto, 10 to 1,000 kW	2,989	+ 1·339
From Saar ..	1,184	+ 305
„ *Switzerland*	1,116	+ 565
Transformers and choking coils ..	747	— 221
From Netherlands	294	+ 169
„ *Switzerland*	237	— 441
Shavers and hair-cutters	2,180	+ 908
From Netherlands	1,662	+ 862
Elec. equipment n.e.i. for cycles, motor cycles, motor vehicles, aircraft, ships or other vehicles	663	— 1,012
From France ..	144	+ 23
„ *Italy* ..	285	— 695
„ *U.K.* ..	144	— 29
Elec. welding app. ..	1,488	+ 374
From U.K. ..	206	+ 131
„ *France* ..	152	+ 115
„ *Switzerland*	784	+ 389

Class of Equipment	Jan.-June 1953 DM (000)	Inc. or dec. DM (000)
Radiological apparatus and accessories ..	669	— 382
From Netherlands	375	— 280
„ *Sweden* ..	84	+ 36
Microphones, amplifiers, loudspeakers, etc.	634	+ 17
From Netherlands	552	— 19
Radio apparatus ..	4,918	+ 2,357
From U.K. ..	1,096	+ 857
„ *Netherlands*	2,826	+ 1,637
Elec. condensers ..	880	+ 352
From Netherlands	623	+ 263
„ *Switzerland*	186	+ 66
Current or voltage controlling, regulating or distributing apparatus	1,596	+ 334
From Netherlands	116	+ 77
„ *Switzerland*	1,150	+ 53
Thermionic or electronic tubes and valves (not for lighting)	6,353	+ 2,039
From France ..	613	+ 333
„ *Netherlands*	4,666	+ 1,160
„ *U.S.A.* ..	655	+ 155